HP 470 G7 Notebook PC

Maintenance and Service Guide

Product notice

This user guide describes features that are common to most models. Some features may not be available on your computer.

Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. Go to http://www.microsoft.com for details.

To access the latest user guides, go to http://www.hp.com/support, and follow the instructions to find your product. Then select **User Guides**.

Software terms

By installing, copying, downloading, or otherwise using any software product preinstalled on this computer, you agree to be bound by the terms of the HP End User License Agreement (EULA). If you do not accept these license terms, your sole remedy is to return the entire unused product (hardware and software) within 14 days for a full refund subject to the refund policy of your seller.

For any further information or to request a full refund of the price of the computer, please contact your seller.

Important Notice about Customer Self-Repair Parts

IMPORTANT: Your computer includes Customer Self-Repair parts and parts that should only be accessed by an authorized service provider. See Chapter 5, "Removal and replacement procedures for Customer Self-Repair parts," for details. Accessing parts described in Chapter 6, "Removal and replacement procedures for Authorized Service Provider only parts," can damage the computer or void your warranty.

Safety warning notice

⚠ **WARNING!**   To reduce the possibility of heat-related injuries or of overheating the computer, do not place the computer directly on your lap or obstruct the computer air vents. Use the computer only on a hard, flat surface. Do not allow another hard surface, such as an adjoining optional printer, or a soft surface, such as pillows or rugs or clothing, to block airflow. Also, do not allow the AC adapter to come into contact with the skin or a soft surface, such as pillows or rugs or clothing, during operation. The computer and the AC adapter comply with the user-accessible surface temperature limits defined by applicable safety standards.

Table of contents

1 Product description

Product components and their descriptions

Category	Description
Product Name	**HP 470 G7 Notebook PC**
Processor	**10th-generation Intel® Core™ processors**
	Intel Core i7-10510U (1.8 GHz [turbo up to 4.9 GHz], 2666 MHz/8 MB L3 cache, quad core, 15 W)
	Intel Core i5-10210U (1.6 GHz [turbo up to 4.2 GHz], 2666 MHz/6 MB L3 cache, quad core, 15 W)
	Intel Core i3-10110U (2.1 GHz [turbo up to 4.1 GHz], 2666 MHz/4 MB L3 cache, dual core, 15 W)
Graphics	Supports HD decode, DX12, HDMI
	Internal graphics
	Intel UHD Graphics 620
	External graphics
	AMD® Radeon™ 530 with up to 2 GB of dedicated video memory
Panel	**43.9 cm (17.3 in), WLED, eDP, flat-flat, ultrawide aspect ratio**
	High definition+ (HD+) (1600 × 900), antiglare, SVA, 220 nits
	Full high-definition (FHD) (1920 × 1080), antiglare, UWVA, 300 nits
Memory	**Two memory module slots**
	Memory is not customer accessible or upgradeable
	DDR4-2666 dual-channel support (DDR4-3200 bridge to DDR4-2666)
	Supports up to 16 MB of system RAM in the following configurations:
	● 16384 MB (8192 MB × 2)
	● 8192 MB (8192 MB × 1)
	● 4096 MB (4096 MB × 1)
Primary storage	**Single hard drive configurations, 6.35 cm (2.5 in), 7.0 mm/7.2 mm/9.5 mm, SATA hard drives**
	2 TB, 5400 rpm, 7.2 mm/9.5 mm
	1 TB, 5400 rpm, 7.2 mm/9.5 mm
	500 GB, 5400 rpm, 7.0 mm
	M.2, SATA-3, solid-state drives
	128 GB, TLC
	PCIe, NVMe, M.2 solid-state drives
	512 GB
	256 GB

Table 1-1 Product components and their descriptions (continued)

Category	Description
	Dual storage configurations
	256 GB, PCIe, solid-state drive + 1 TB, 5400 rpm hard drive
	128 GB, SATA-3, TLC, solid-state drive + 1 TB, 5400 rpm hard drive
	Optane™ configurations
	16 GB, PCIe, Optane solid-state drive + 2 TB, 5400 rpm hard drive
	16 GB, PCIe, Optane solid-state drive + 1 TB, 5400 rpm hard drive
Optical drive (select products only)	9.0 mm tray load - SATA - fixed
	DVD+/-RW Double-Layer Writer
Camera	**HP TrueVision HD Camera** - indicator LED, USB 2.0, HD BSI sensor, f2.0, WDR
	720p by 30 frames per second
	Single digital microphone
Audio	**Audio control panel**: HP Audio Center
	Dual speakers
Ethernet	Ethernet Integrated 10/100/1000 NIC
Wireless networking	Compatible with Miracast™ devices
	Integrated wireless options with dual antennas
	Realtek RTL8822CE 802.11ac 2 × 2 Wi-Fi + Bluetooth 5 Combo Adapter
	Intel Wi-Fi 6 AX201, 802.11ax 2 × 2 + Bluetooth 5 (non-vPro, supporting gigabit file transfer speeds)
Media card reader	Supports microSD™/SDHC™/SDXC™
	Push-pull insertion/removal
Internal card expansion	One M.2 slot for solid-state drive
	One M.2 slot for WLAN
Ports	USB 2.0 port (right side)
	(2) USB 3.1 Gen 1 ports (left side)
	HDMI v1.4b supporting: up to 1920 × 1080 @ 60 Hz
	Hot plug/unplug and auto detect for correct output to wide-aspect vs. standard aspect video (auto adjust panel resolution to fit embedded panel and external monitor connected)
	RJ-45 (network) jack
	Audio-out (headphone)/audio-in (microphone) combo jack
	AC Smart Pin adapter plug
Keyboard/pointing devices	**Keyboard**
	Full-size, textured, island-style keyboard with numeric keypad
	Full-size, two coat paint, backlit, island-style keyboard with numeric keypad
	Touchpad with image sensor

Table 1-1 Product components and their descriptions (continued)

Category	Description
	Multitouch gestures enabled
	Support Modern Trackpad Gestures
	Taps enabled by default
Power requirements	**Battery**
	3 cell Prismatic/Polymer battery, 41 Whr
	Supports battery fast charge
	AC adapter, barrel type
	65 W Smart, nPFC, right angle, 4.5 mm, 1.8 m
	65 W Smart, nPFC, 4.5 mm, EM
	Power cord (C5)
	1 m, conventional
Security	Mini security cable slot
	Supports Trusted Platform Module (TPM) 2.0
Operating system	FreeDOS 3.0
	Windows® 10 Home 64
	Windows 10 Home 64 Plus
	Windows 10 Professional 64
	Windows 10 Home Professional 64 StF MSNA Strategic
Serviceability	**User replaceable parts**
	AC adapter
	Optical drive

2 Getting to know your computer

Your computer features top-rated components. This chapter provides details about your components, where they are located, and how they work.

Right side
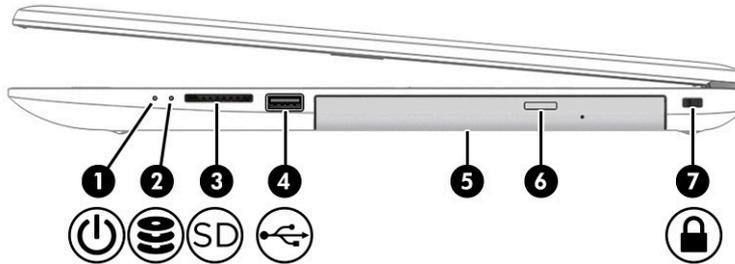
Table 2-1 Right-side components and their descriptions

Component		Description
(1)	Power light	• On: The computer is on.
		• Blinking (select products only): The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unnecessary components.
		• Off: Depending on your computer model, the computer is off, in Hibernation, or in Sleep. Hibernation is the power-saving state that uses the least amount of power.
(2)	Drive light	• Blinking white: The hard drive is being accessed.
(3)	Memory card reader	Reads optional memory cards that store, manage, share, or access information.
		To insert a card:
		1. Hold the card label-side up, with connectors facing the computer.
		2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated.
		To remove a card:
		▲ Press in on the card, and then remove it from the memory card reader.
(4)	USB port	Connects a USB device, provides data transfer, and (for select products) charges small devices when the computer is on or in Sleep mode.
(5)	Optical drive (select products only)	Depending on your computer model, reads an optical disc or reads and writes to an optical disc.
(6)	Optical drive eject button	Releases the optical drive disc tray.
(7)	Security cable slot	Attaches an optional security cable to the computer.
		NOTE: The security cable is designed to act as a deterrent, but it might not prevent the computer from being mishandled or stolen.

Left side
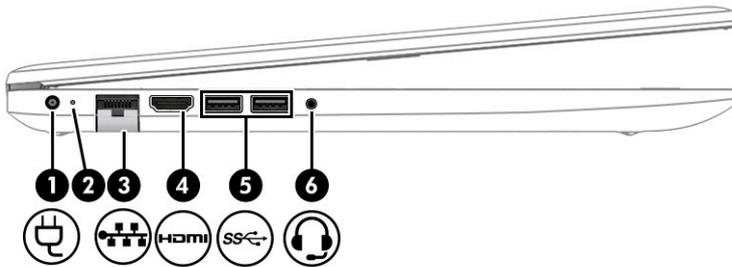
Table 2-2 Left-side components and their descriptions

Component			Description
(1)		Power connector	Connects an AC adapter.
(2)		Battery light	When AC power is connected: • White: The battery charge is greater than 90%. • Amber: The battery charge is from 0 to 90%. • Off: The battery is not charging. When AC power is disconnected (battery not charging): • Blinking amber: The battery has reached a low battery level. When the battery has reached a critical battery level, the battery light begins blinking rapidly.
(3)		RJ-45 (network) jack/status lights	Connects a network cable. • Green (left): The network is connected. • Amber (right): Activity is occurring on the network.
(4)		HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High-Definition Multimedia Interface (HDMI) device.
(5)		USB SuperSpeed ports (2)	Connect a USB device, provide high-speed data transfer, and (for select products) charge small devices when the computer is on or in Sleep mode.
(6)		Audio-out (headphone)/Audio-in (microphone) combo jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional standalone microphones. **WARNING!** To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the *Regulatory, Safety, and Environmental Notices*. To access this guide: ▲ Type `HP Documentation` in the taskbar search box, and then select **HP Documentation**. **NOTE:** When a device is connected to a headphone jack, the computer speakers are disabled.

Display
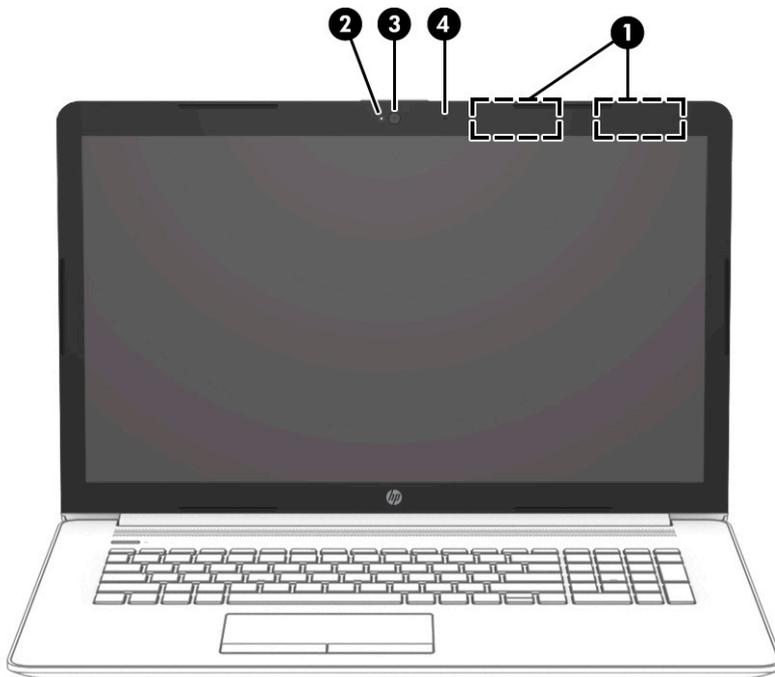
Table 2-3 Display components and their descriptions

Component		Description
(1)	WLAN antennas*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(2)	Camera light	On: The camera is in use.
(3)	Camera	Allows you to video chat, record video, and record still images. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. **NOTE:** Camera functions vary depending on the camera hardware and software installed on your product.
(4)	Internal microphone	Records sound.

*The antennas are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions.

For wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.

To access this guide:

▲ Type HP Documentation in the taskbar search box, and then select **HP Documentation**.

Keyboard area

Touchpad
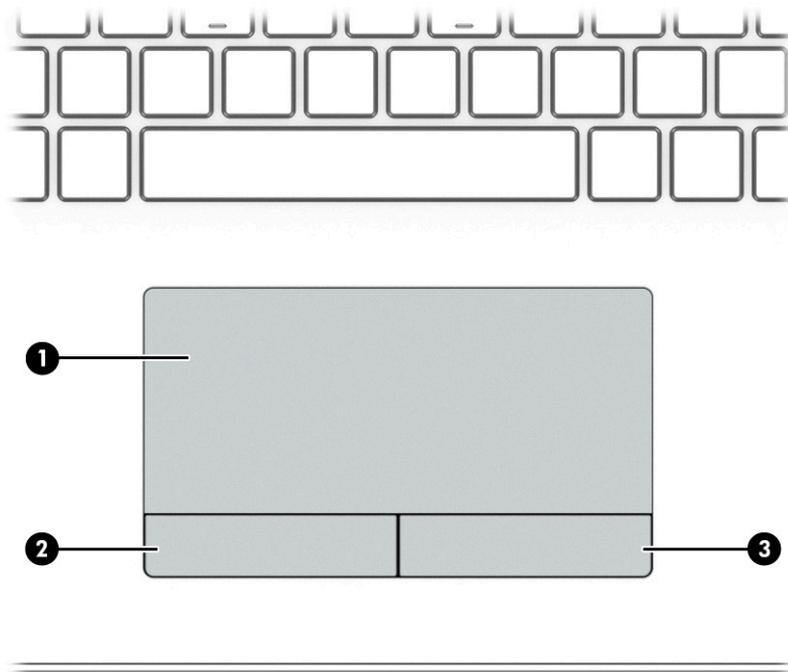
Table 2-4 Touchpad components and their descriptions

Component		Description
(1)	Touchpad zone	Reads your finger gestures to move the pointer or activate items on the screen.
(2)	Left touchpad button	Functions like the left button on an external mouse.
(3)	Right touchpad button	Functions like the right button on an external mouse.

Lights
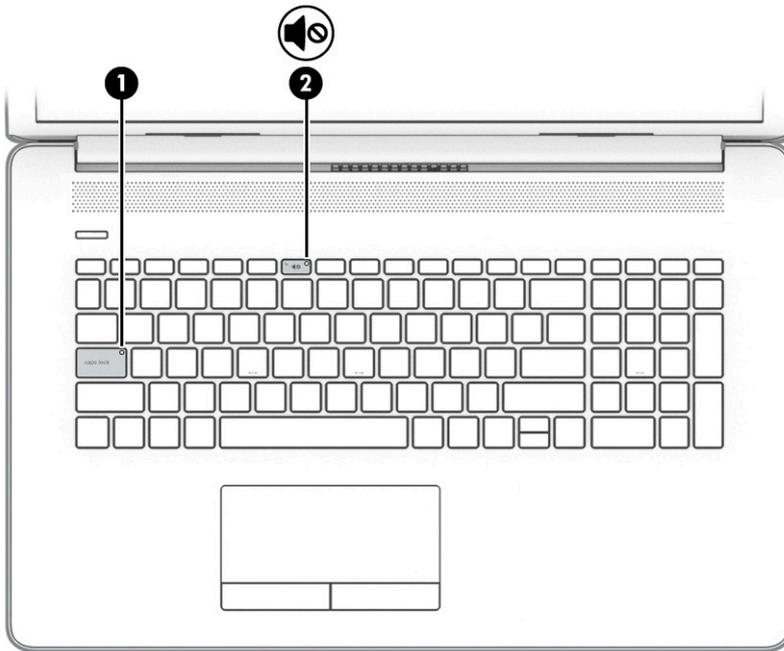
Table 2-5 Lights and their descriptions

Component		Description
(1)	Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(2)	Mute light	● On: Computer sound is off.
		● Off: Computer sound is on.

Button, vent, and speakers
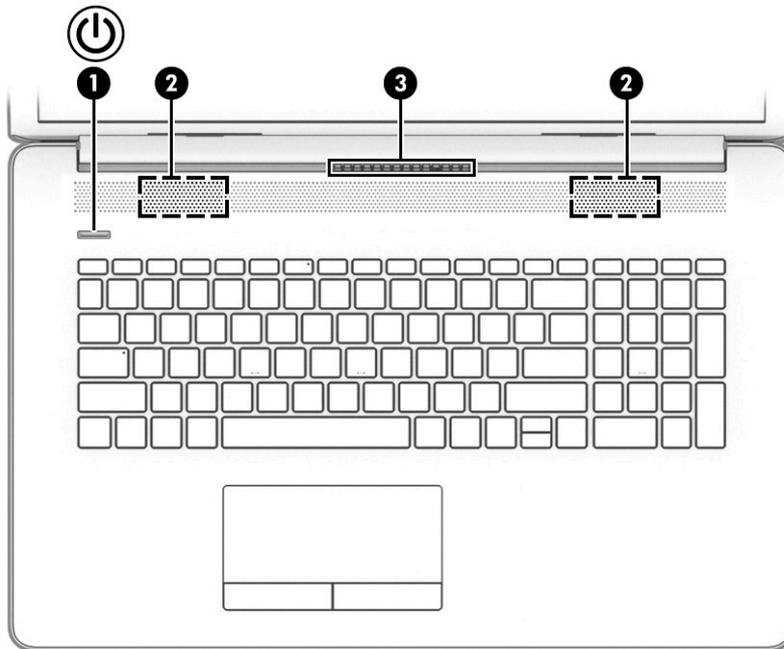
Table 2-6 Button, vent, and speakers and their descriptions

Component		Description
(1)	Power button	• When the computer is off, press the button to turn on the computer.
		• When the computer is on, press the button briefly to initiate Sleep.
		• When the computer is in the Sleep state, press the button briefly to exit Sleep (select products only).
		• When the computer is in Hibernation, press the button briefly to exit Hibernation.
		IMPORTANT: Pressing and holding down the power button results in the loss of unsaved information.
		If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer.
		To learn more about your power settings, see your power options:
		▲ Right-click the **Power meter** icon [■], and then select **Power Options**.
(2)	Speakers (2)	Produce sound.
(3)	Vent	Enables airflow to cool internal components.
		NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

Special keys

Table 2-7 Special keys and their descriptions

Component		Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes specific functions when pressed in combination with another key.
(3)	Windows key	Opens the Start menu. **NOTE:** Pressing the Windows key again closes the Start menu.
(4)	Action keys	Execute frequently used system functions.
(5)	num lk key	Alternates between the navigational and numeric functions on the integrated numeric keypad.
(6)	Integrated numeric keypad	A separate keypad to the right of the alphabet keyboard. When num lk is pressed, the keypad can be used like an external numeric keypad. **NOTE:** If the keypad function is active when the computer is turned off, that function is reinstated when the computer is turned back on.

Bottom
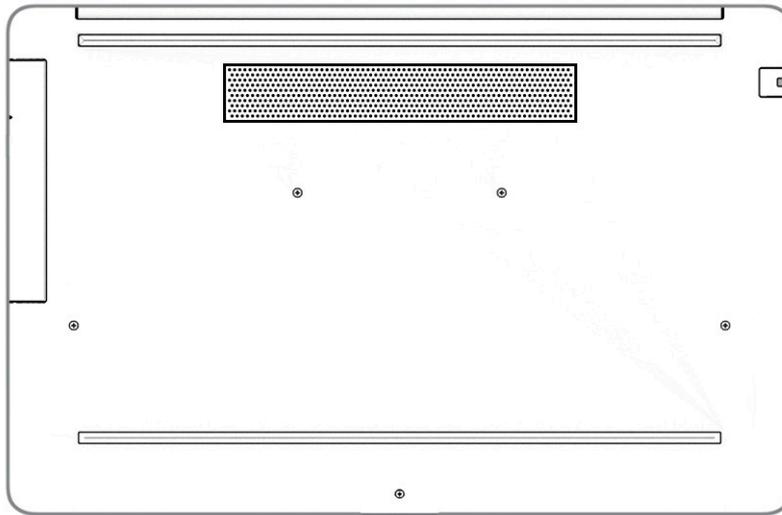
Table 2-8 Bottom components and their descriptions

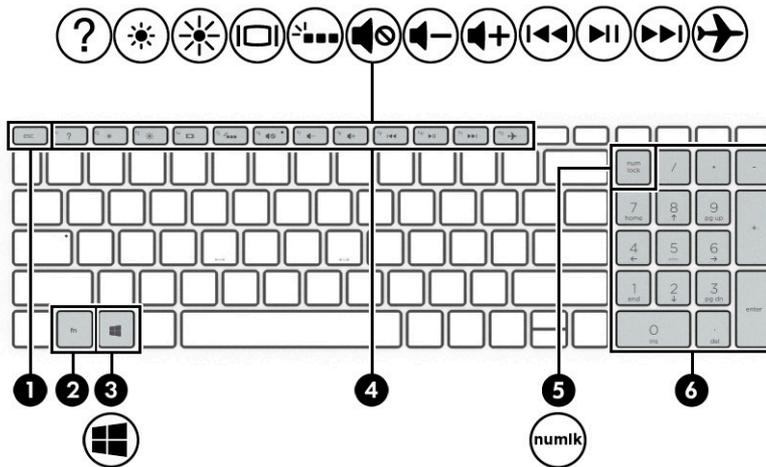| Component	Description
Vent	Enables airflow to cool internal components.
	NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

Labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems or travel internationally with the computer. Labels may be in paper form or imprinted on the product.

IMPORTANT: Check the following locations for the labels described in this section: the bottom of the computer, inside the battery bay, under the service door, on the back of the display, or on the bottom of a tablet kickstand.

- Service label—Provides important information to identify your computer. When contacting support, you may be asked for the serial number, the product number, or the model number. Locate this information before you contact support.
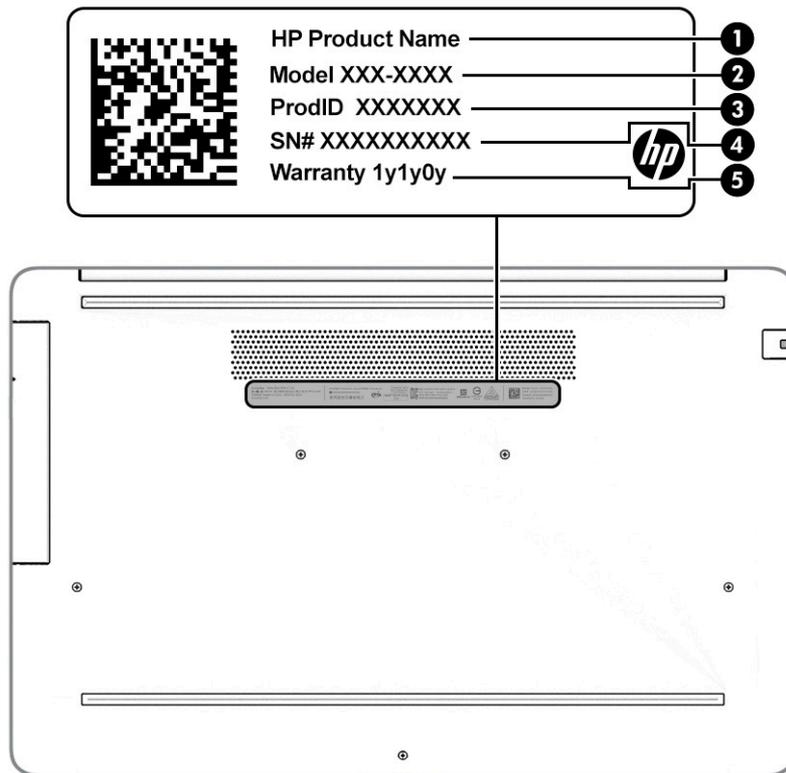
Table 2-9 Service label components

	Component
(1)	HP product name
(2)	Model number
(3)	Product ID
(4)	Serial number
(5)	Warranty period

- Regulatory label(s)—Provide(s) regulatory information about the computer.

- Wireless certification label(s)—Provide(s) information about optional wireless devices and the approval markings for the countries or regions in which the devices have been approved for use.

3 Illustrated parts catalog

Computer major components

> **NOTE:** HP continually improves and changes product parts. For complete and current information about supported parts for your computer, go to http://partsurfer.hp.com, select your country or region, and then follow the on-screen instructions.

> **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Labels on page 12 for details.
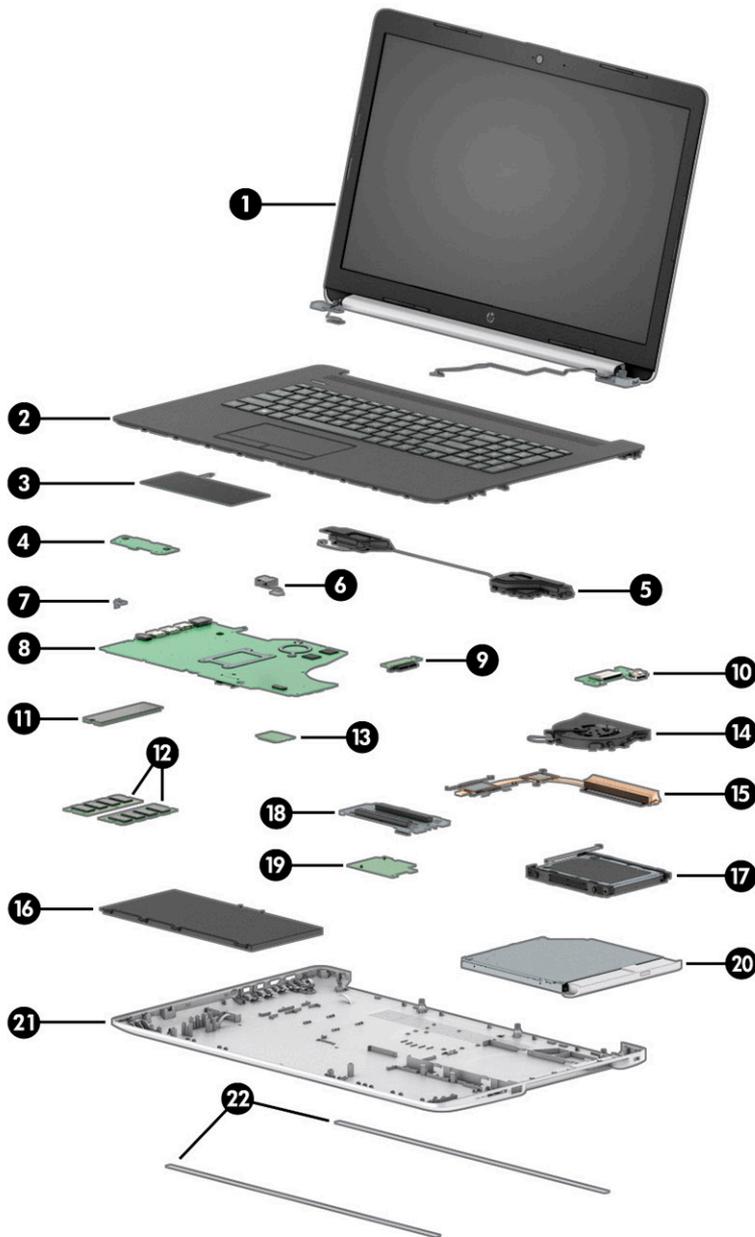
Table 3-1 Computer major components and their descriptions

Item	Component	Spare part number
(1)	**Display**	Not available
	NOTE: Display spare parts are available as subcomponents, not as whole units. Display subcomponent spare parts are available.	
	For spare part information, see <u>Display assembly subcomponents on page 17</u>.	
(2)	**Top cover/keyboard**	
	NOTE: For a detailed list of country codes, see <u>Top cover with keyboard on page 62</u>.	
	Keyboard, backlit, models without an optical drive	L83727-xx1
	Keyboard, no backlight, models with an optical drive	L83728-xx1
	Keyboard, backlit, models with an optical drive	L91024-xx1
	Keyboard, no backlight, models without an optical drive	L91025-xx1
(3)	**Touchpad module**	L22586-001
(4)	**Touchpad button board**	L22539-001
(5)	**Speakers**	L22580-001
(6)	**Power connector cable (DC-in)**	L22528-001
(7)	**System board hook**	L22748-001
(8)	**System board**	
	NOTE: All system board spare part kits include replacement thermal material.	
	All system boards use the following part numbers:	
	xxxxxx-001: Non-Windows operating systems	
	xxxxxx-601: Windows operating system	
	Intel Core i7-10510U processor with 2 GB of AMD Radeon 530 graphics memory	L67091-xx1
	Intel Core i5-10210U processor with 2 GB of AMD Radeon 530 graphics memory	L67090-xx1
	Intel Core i3-10110U processor with 2 GB of AMD Radeon 530 graphics memory	L83735-xx1
(9)	**Optical drive board** (select products only)	L22540-001
(10)	**USB board**	L22538-001
(11)	**Solid-state drive**	
	512 GB, PCIe	L83739-001
	256 GB, PCIe	L83738-001
	128 GB, SATA-3, TLC	L83737-001
(12)	**Memory modules** (2666 MHz, DDR4)	
	8 GB	937236-855
	4 GB	L10598-855
(13)	**WLAN module**	
	Realtek RTL8822CE 802.11ac 2 × 2 Wi-Fi + Bluetooth 5 Combo Adapter	L44796-005

Table 3-1 Computer major components and their descriptions (continued)

Item	Component	Spare part number
	Intel Wi-Fi 6 AX201, 802.11ax 2 × 2 + Bluetooth 5 (non-vPro, supporting gigabit file transfer speeds)	L57250-005
(14)	**Fan**	L22529-001
(15)	**Heat sink**	L22531-001
(16)	**Battery** (3 cell, 41 WHr)	L11119-855
(17)	**Hard drive**	
	2 TB, 5400 rpm	912487-855
	1 TB, 5400 rpm	L30422-005
	500 GB, 5400 rpm	778186-005
(18)	**Solid-state drive bracket**	L22535-001
(19)	**Solid-state drive board**	L24487-001
(20)	**DVD+/-RW Double-Layer Writer** (select products only)	L22537-001
(21)	**Bottom cover**	
	For use in models with an optical drive	L83726-001
	For use in models without an optical drive	L83725-001
(22)	**Rubber feet** (front and rear)	L83731-001

Cables
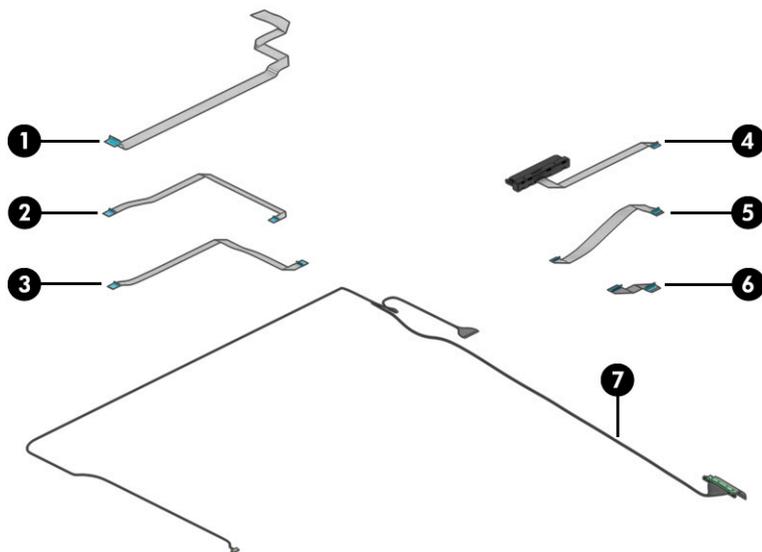
Table 3-2 Cables and their descriptions

Item	Component	Spare part number
(1)	**USB board cable**	L22522-001
(2)	**Touchpad cable**	L22525-001
(3)	**Touchpad button board cable**	L22523-001
(4)	**Hard drive cable**	L22526-001
(5)	**Solid-state drive cable**	L22527-001
(6)	**Optical drive board cable**	L22524-001
(7)	**Display cable**	
	FHD panel	L22520-001
	HD panel	L22519-001

Display assembly subcomponents
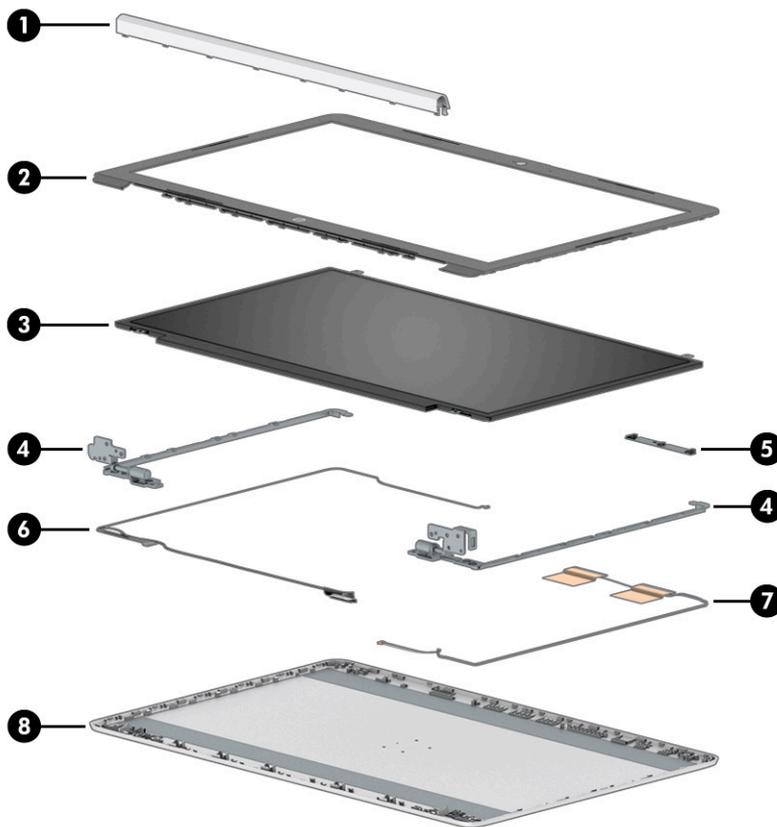
Table 3-3 Display assembly components and their descriptions

Item	Component	Spare part number
(1)	**Hinge cover**	L83730-001
(2)	**Display bezel**	L22517-001
(3)	**Display panel**	
	FHD	L83733-001
	HD+	L83734-001
(4)	**Hinge Kit** (includes left and right hinges)	L22536-001
(5)	**Camera module**	L22587-001
	Display cable	
(6)	For use with HD displays	L22519-001
	For use with FHD displays	L22520-001
(7)	**WLAN antenna cables**	L22497-001
(8)	**Back cover**	L83724-001

Mass storage devices
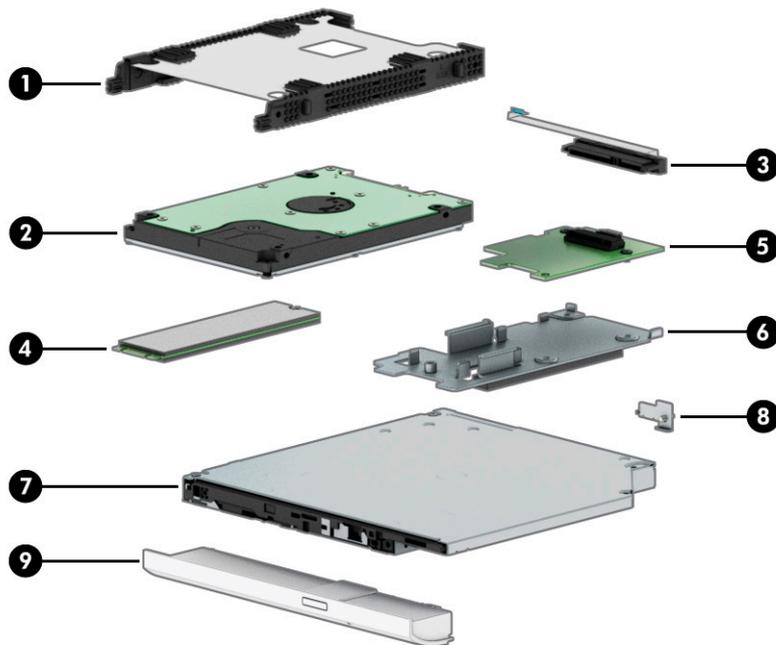
Table 3-4 Mass storage devices and their descriptions

Item	Component	Spare part number
(1)	**Hard drive cover**	L22534-001
(2)	**Hard drive**, 7 mm	
	2 TB, 5400 rpm	912487-855
	1 TB, 5400 rpm	L30422-005
	500 GB, 5400 rpm	778186-005
(3)	**Hard drive cable**	L22526-001
(4)	**Solid-state drive** (M.2)	
	512 GB, PCIe	L83739-001
	256 GB, PCIe	L83738-001
	256 GB, SATA-3, TLC	L83737-001
	Optane memory module, 16 GB	L22585-001
(5)	**Solid-state drive board**	L24487-001
(6)	**Solid-state drive bracket**	L22535-001
(7)	**DVD+/-RW Double-Layer Writer**	L22537-001
(8)	**Optical drive bracket**	L22533-001
(9)	**Optical drive bezel**	L83729-001

Miscellaneous parts

Table 3-5 Miscellaneous parts and their descriptions

Component	Spare part number
AC adapter (65 W, nPFC, 3 pin, 4.5 mm)	710412-001
Power cord, C5, conventional, 1.0 m	
For use in Denmark	L19360-001
For use in Europe	L19361-001
For use in Israel	L19362-001
For use in Japan	L19365-001
For use in North America	L19367-001
For use in South Africa	L19369-001
For use in South Korea	L19366-001
For use in Switzerland	L19370-001
For use in Taiwan	L19372-001
For use in Thailand	L19371-001
For use in the United Kingdom	L19373-001
Power adapter, C5, for use in Japan	226768-001
Screw Kit	L83732-001

4 Removal and replacement procedures preliminary requirements

Tools required

You need the following tools to complete the removal and replacement procedures:

- Nonconductive, nonmarking pry tool
- Magnetic Phillips P1 screwdriver

Service considerations

The following sections include some of the considerations that you must keep in mind during disassembly and assembly procedures.

NOTE: As you remove each subassembly from the computer, place the subassembly (and all accompanying screws) away from the work area to prevent damage.

Plastic parts

IMPORTANT: Using excessive force during disassembly and reassembly can damage plastic parts.

Cables and connectors

IMPORTANT: When servicing the computer, be sure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

Cables must be handled with extreme care to avoid damage. Apply only the tension required to unseat or seat the cables during removal and insertion. Handle cables by the connector whenever possible. In all cases, avoid bending, twisting, or tearing cables. Be sure that cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced. Handle flex cables with extreme care; these cables tear easily.

Drive handling

IMPORTANT: Drives are fragile components that must be handled with care. To prevent damage to the computer, damage to a drive, or loss of information, observe these precautions:

Before removing or inserting a hard drive, shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

Before handling a drive, be sure that you are discharged of static electricity. While handling a drive, avoid touching the connector.

Before removing an optical drive, be sure that a disc is not in the drive and be sure that the optical drive tray is closed.

Handle drives on surfaces covered with at least 2.54 cm (1 inch) of shock-proof foam.

Avoid dropping drives from any height onto any surface.

After removing a hard drive or an optical drive, place it in a static-proof bag.

Avoid exposing an internal hard drive to products that have magnetic fields, such as monitors or speakers.

Avoid exposing a drive to temperature extremes or liquids.

If a drive must be mailed, place the drive in a bubble pack mailer or other suitable form of protective packaging and label the package "FRAGILE."

Workstation guidelines

Follow these grounding workstation guidelines:

- Cover the workstation with approved static-shielding material.

- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.

- Use conductive field service tools, such as cutters, screw drivers, and vacuums.

- When fixtures must directly contact dissipative surfaces, use fixtures made only of static-safe materials.

- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and polystyrene foam.

- Handle ESD-sensitive components, parts, and assemblies by the case or PCM laminate. Handle these items only at static-free workstations.

- Avoid contact with pins, leads, or circuitry.

- Turn off power and input signals before inserting or removing connectors or test equipment.

Electrostatic discharge information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) might not appear to be affected at all and can work perfectly throughout a normal cycle. The device might function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

IMPORTANT: To prevent damage to the device when you are removing or installing internal components, observe these precautions:

Keep components in their electrostatic-safe containers until you are ready to install them.

Before touching an electronic component, discharge static electricity by using the guidelines described in this section.

Avoid touching pins, leads, and circuitry. Handle electronic components as little as possible.

If you remove a component, place it in an electrostatic-safe container.

Generating static electricity

Note the following:

- Different activities generate different amounts of static electricity.

- Static electricity increases as humidity decreases.

Table 4-1 Static electricity occurrence based on activity and humidity

	Relative humidity		
Event	55%	40%	10%
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing DIPs (dual in-line packages) from plastic tube	400 V	700 V	2,000 V
Removing DIPs from vinyl tray	2,000 V	4,000 V	11,500 V
Removing DIPs from polystyrene foam	3,500 V	5,000 V	14,500 V
Removing bubble pack from PCB (printed circuit board)	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V
Multiple electric components can be packaged together in plastic tubes, trays, or polystyrene foam.			

NOTE: As little as 700 V can degrade a product.

Preventing electrostatic damage to equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent static electricity damage to electronic components.

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.

- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.

- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.

- Place items on a grounded surface before removing them from their container.

- Always be properly grounded when touching a sensitive component or assembly.

- Avoid contact with pins, leads, or circuitry.

- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal grounding methods and equipment

Use the following equipment to prevent static electricity damage to electronic components:

- **Wrist straps** are flexible straps with a maximum of 1 MΩ ±10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.

- **Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of 1 MΩ ±10% resistance between the operator and ground.

Table 4-2 Static shielding protection levels

Static shielding protection levels	
Method	**Voltage**
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding the work area

To prevent static damage at the work area, use the following precautions:

- Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.

- Use static-dissipative mats, foot straps, or air ionizers to give added protection.

- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.

- Turn off power and input signals before inserting and removing connectors or test equipment.

- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.

- Keep work area free of nonconductive materials such as ordinary plastic assembly aids and polystyrene foam.

- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

Recommended materials and equipment

HP recommends the following materials and equipment to prevent static electricity:

- Antistatic tape

- Antistatic smocks, aprons, or sleeve protectors

- Conductive bins and other assembly or soldering aids

- Conductive foam

- Conductive tabletop workstations with ground cord of 1 MΩ ±10% resistance

- Static-dissipative table or floor mats with hard tie to ground

- Field service kits

- Static awareness labels

- Wrist straps and footwear straps providing 1 MΩ ±10% resistance

- Material handling packages

- Conductive plastic bags

- Conductive plastic tubes

- Conductive tote boxes

- Opaque shielding bags

- Transparent metallized shielding bags

- Transparent shielding tubes

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

- To avoid hand contact, transport products in static-safe tubes, bags, or boxes.

- Protect ESD-sensitive parts and assemblies with conductive or approved containers or packaging.

- Keep ESD-sensitive parts in their containers until the parts arrive at static-free workstations.

- Place items on a grounded surface before removing items from their containers.

- Always be properly grounded when touching a component or assembly.

- Store reusable ESD-sensitive parts from assemblies in protective packaging or nonconductive foam.

- Use transporters and conveyors made of antistatic belts and roller bushings. Be sure that mechanized equipment used for moving materials is wired to ground and that proper materials are selected to avoid static charging. When grounding is not possible, use an ionizer to dissipate electric charges.

5 Removal and replacement procedures for Customer Self-Repair parts

This chapter provides removal and replacement procedures for Customer Self-Repair parts.

NOTE: The Customer Self-Repair program is not available in all locations. Installing a part not supported by the Customer Self-Repair program may void your warranty. Check your warranty to determine if Customer Self-Repair is supported in your location.

Component replacement procedures

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Labels on page 12 for details.

NOTE: HP continually improves and changes product parts. For complete and current information about supported parts for your computer, go to http://partsurfer.hp.com, select your country or region, and then follow the on-screen instructions.

Preparation for disassembly

See Removal and replacement procedures preliminary requirements on page 20 for initial safety procedures.

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

2. Disconnect the power from the computer by unplugging the power cord from the computer.

3. Disconnect all external devices from the computer.

Optical drive (select products only)

**Table 5-1** Optical drive description and part number

| Description	Spare part number
DVD+/-RW Double-Layer Writer	L22537-001
Optical drive bracket	L22533-001
Optical drive bezel	L83729-001

Before removing the optical drive, follow these steps:

▲ Prepare the computer for disassembly (Preparation for disassembly on page 25).
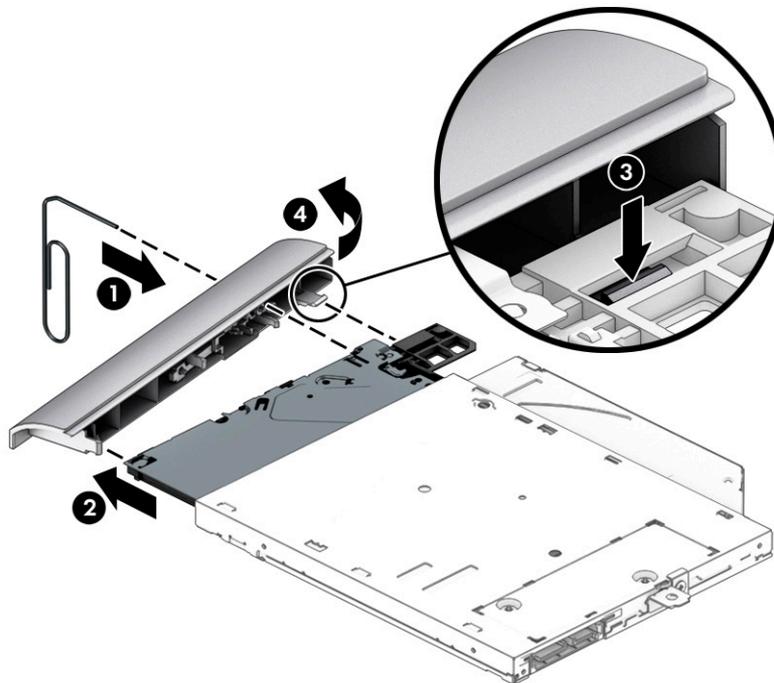
Remove the optical drive:

1. Remove the Phillips M2.5 × 6.0 screw **(1)** that secures the drive to the computer.

2. Slide the optical drive out of the computer **(2)**.
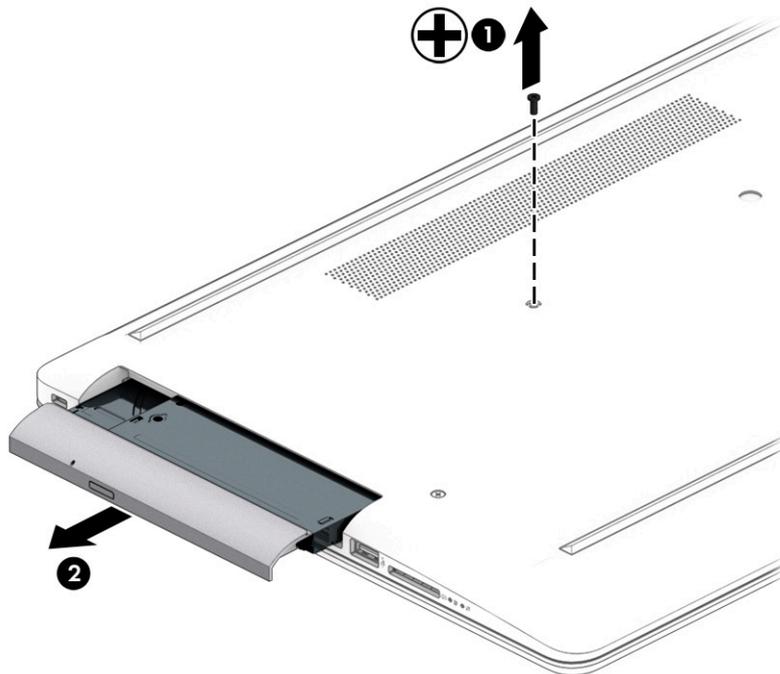
3. If it necessary to remove the bracket from the rear of the optical drive, remove the Phillips M2.0 × 3.0 screw **(1)**, and the remove the bracket from the drive **(2)**.
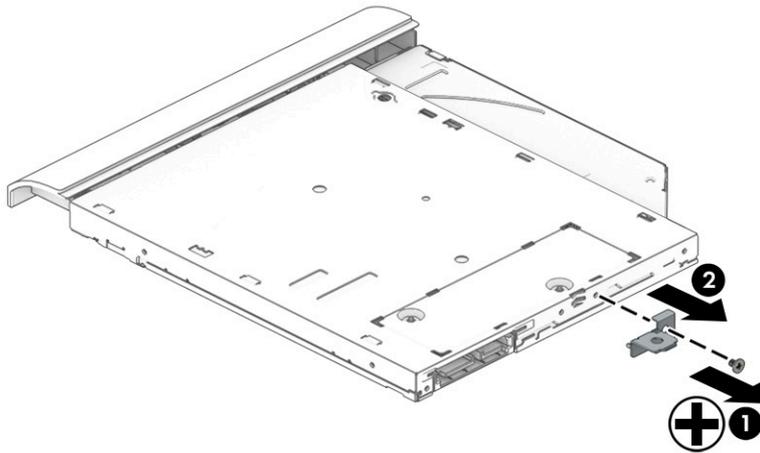
4. If it necessary to remove the bezel from the front of the optical drive:

    a. Insert a paper clip into the release hole on the front of the bezel **(1)**. The left side of the bezel rotates outward **(2)**.

    b. Press the tab to release the bezel from the drive **(3)**.

    c. Rotate the side of the bezel **(4)**, and then remove it.

Reverse this procedure to reassemble and install the optical drive.

6 Removal and replacement procedures for authorized service provider parts

📝 **IMPORTANT:** Components described in this chapter should be accessed only by an authorized service provider. Accessing these parts can damage the computer or void the warranty.

📝 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Labels on page 12 for details.

Component replacement procedures

📝 **NOTE:** HP continually improves and changes product parts. For complete and current information about supported parts for your computer, go to http://partsurfer.hp.com, select your country or region, and then follow the on-screen instructions.

There are as many as 54 screws that must be removed, replaced, or loosened when servicing authorized service provider only parts. Make special note of each screw size and location during removal and replacement.
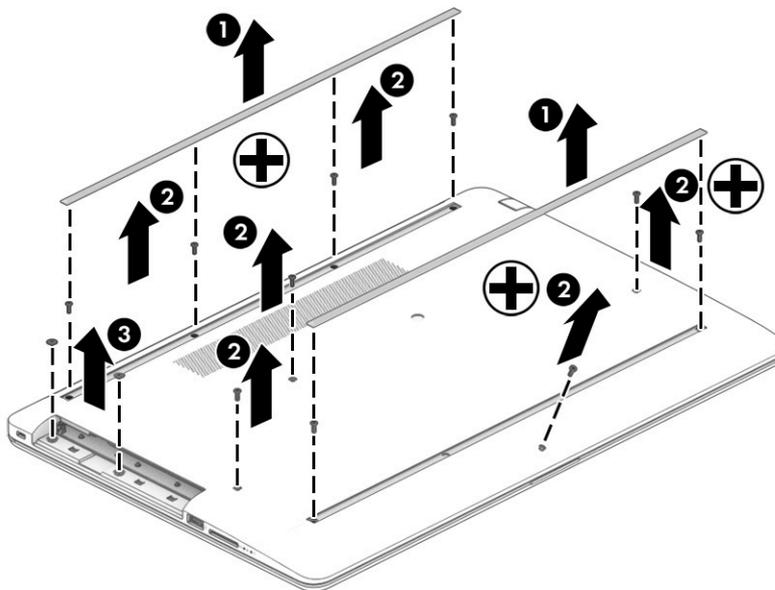
Bottom cover

Table 6-1 Bottom cover description and part number

Description	Spare part number
Bottom cover for use in models with an optical drive	L83726-001
Bottom cover for use in models without an optical drive	L83725-001
Computer feet (front and rear)	L83731-001

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

Remove the bottom cover:

1. Peel the rubber feet off the bottom of the computer **(1)**.

2. Remove the 10 Phillips M2.5 × 6.0 screws **(2)**.

3. (Optical drive models only) Remove the two Phillips broad head M2.0 × 2.0 screws **(3)** from the optical drive bay.

4. Starting near the optical drive bay **(1)**, pull to release the bottom cover from the computer **(2)**.

📝 **NOTE:** Model with an optical drive shown.

Reverse this procedure to install the bottom cover.

Battery

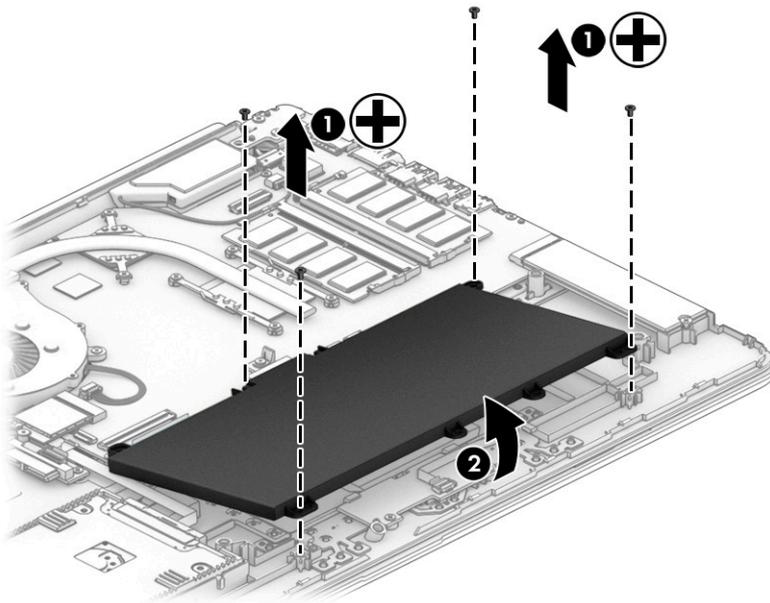| Description	Spare part number
Battery (3 cell, 41 Wr)	L11119-855

Before removing the battery, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

Remove the battery:

1. Remove the four Phillips M2.0 × 3.0 screws **(1)** that secure the battery to the computer.

2. Remove the battery from the computer **(2)**.

Reverse this procedure to install the battery.

When installing the battery, be sure to install screws in the proper locations. The following image shows the locations around the battery that have holes but do not require screws.
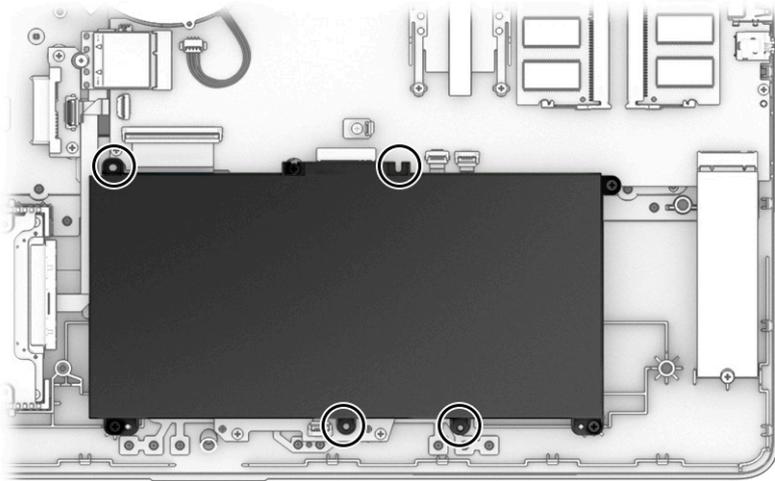
Memory

Description	Spare part number
Memory module, 8 GB	937236-855
Memory module, 4 GB	L10598-855

Before removing the memory modules, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the memory modules:

1. Spread the two retention clips outward **(1)** until the memory module tilts up at a 45° angle.

2. Grasp the edge of the memory module **(2)**, and then gently pull the module out of the slot. Use the same procedure to remove both memory modules.

IMPORTANT: To prevent damage to the memory module, hold the memory module by the edges only. Do not touch the components on the memory module.

To protect a memory module after removal, place it in an electrostatic-safe container.
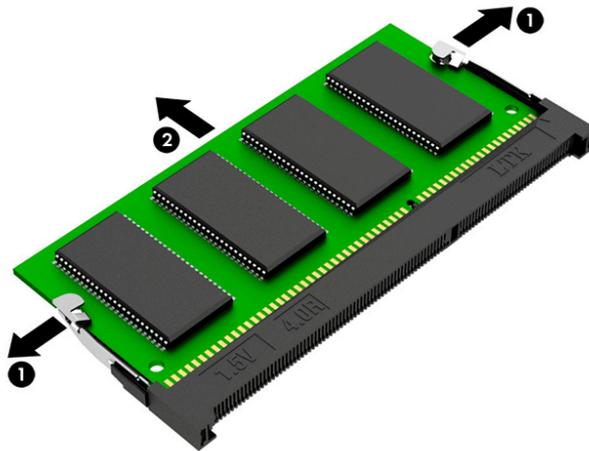

Install the memory modules:

IMPORTANT: To prevent damage to the memory module, hold the memory module by the edges only. Do not touch the components on the memory module. Do not bend the memory module.

1. Align the notched edge of the memory module with the tab in the memory module slot **(1)**.

2. Press the module into the slot until seated **(2)**.

3. Gently press down on the module edges until the side retention clips snap into place **(3)**.
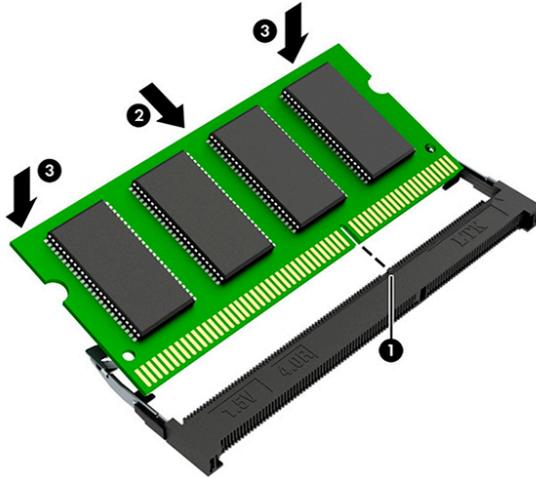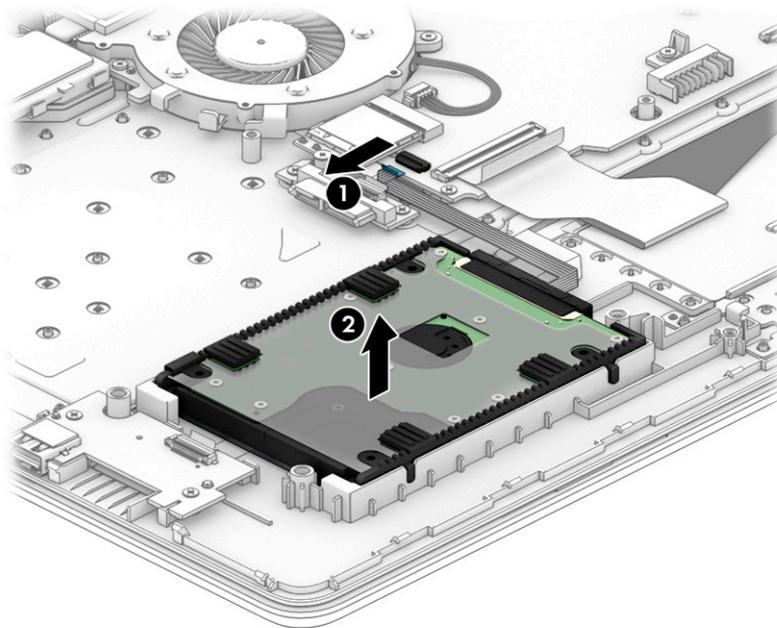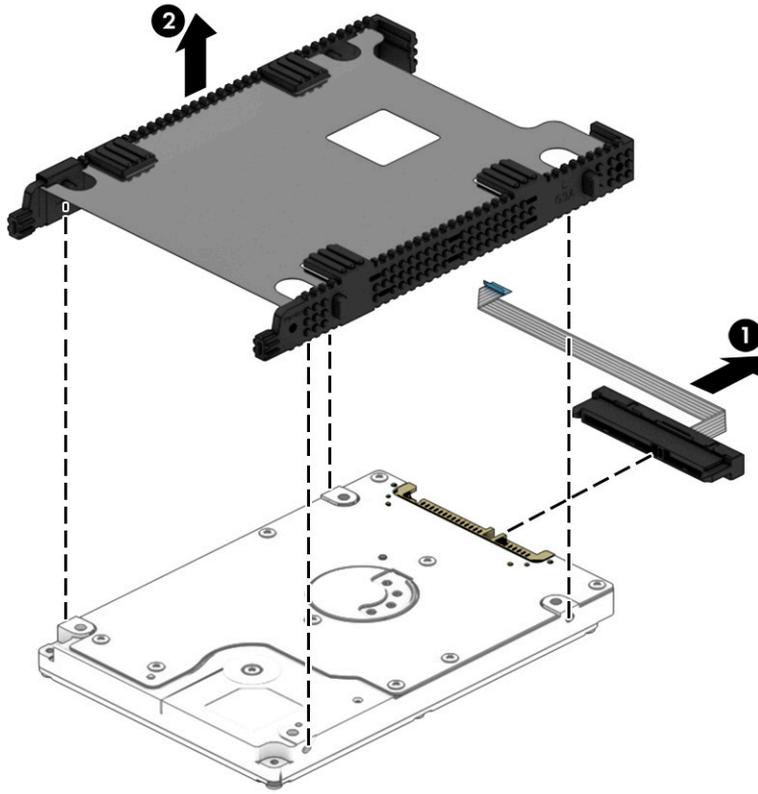
Hard drive

Description	Spare part number
Hard drive, 2 TB, 5400 rpm, 7 mm	912487-855
Hard drive, 1 TB, 5400 rpm, 7 mm	L30422-005
Hard drive, 500 GB, 5400 rpm, 7 mm	778186-005
Hard drive cover	L22534-001

Before removing the hard drive, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the hard drive:

1. Disconnect the hard drive cable from the system board ZIF connector **(1)**.

2. Lift the hard drive out of the computer **(2)**.

3. If it is necessary to disassemble the hard drive, pull the connector off the rear of the drive **(1)**, and then lift the cover off the drive **(2)**.

Reverse this procedure to reassemble and install the hard drive.
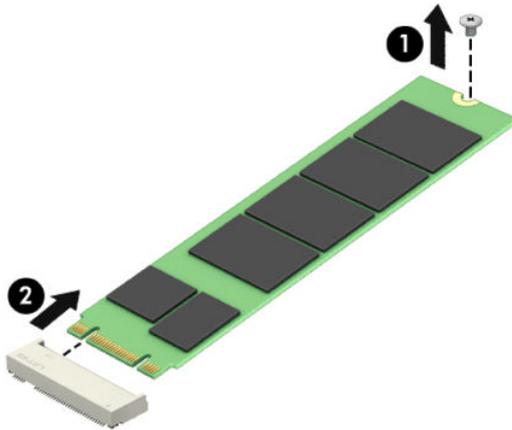
Optane memory module (select products only)

IMPORTANT: The M.2 connector that supports the Optane memory module can also support a solid-state drive. You cannot simultaneously install both an Optane memory module and a solid-state drive in the computer.

Before removing the Optane memory module, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the Optane memory module:

▲ Remove the Phillips M2.0 × 3.0 screw **(1)**, and then pull the solid-state drive module from the socket **(2)**.

Reverse this procedure to install the Optane memory module.

Solid-state drive (select products only)

IMPORTANT: The M.2 connector that supports a solid-state drive can also support an Optane memory module. You cannot simultaneously install both an Optane memory module and a solid-state drive in the computer.

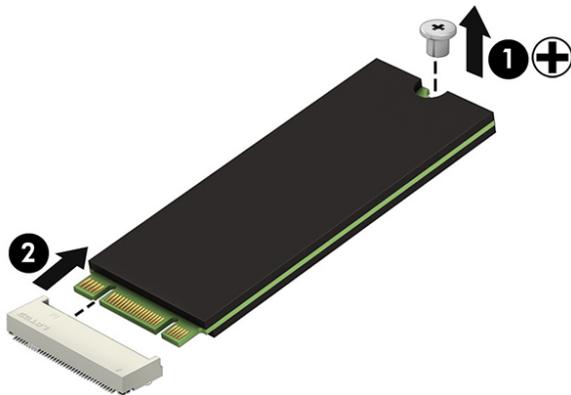**Table 6-5 Solid–state drive descriptions and part numbers**

Description	Spare part number
512 GB, PCIe	L83739-001
256 GB, PCIe	L83738-001
128 GB, SATA-3, TLC	L83737-001

Before removing the solid-state drive, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the solid-state drive:

▲ Remove the Phillips M2.0 × 3.0 screw **(1)**, and then pull the solid-state drive module from the socket **(2)**.

Reverse this procedure to install the solid-state drive.

Solid-state drive bracket and connector board (select products only)

Table 6-6 Solid-state drive bracket and connector board descriptions and part numbers
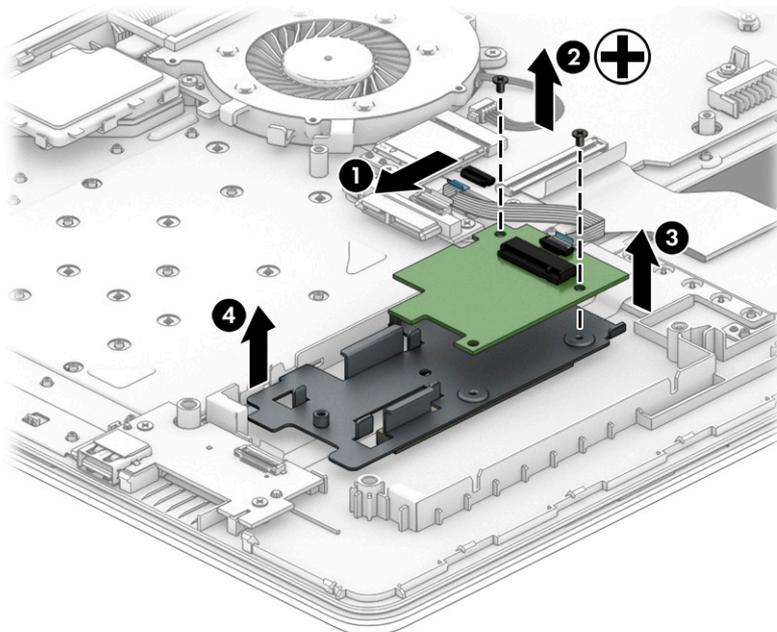
Description	Spare part number
Solid-state drive bracket	L22535-001
Solid-state drive connector board	L24487-001
Solid-state drive cable	L22527-001

Before removing the solid-state drive bracket and connector board, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

5. Remove the solid-state drive (see Solid-state drive (select products only) on page 38).

Remove the solid-state drive bracket and connector board:

1. Disconnect the cable from the system board ZIF connector **(1)**.

2. Remove the two Phillips M2.0 × 3.0 screws **(2)** that secure the board and bracket to the computer.

3. Remove the board from the computer **(3)**.

4. Remove the bracket from the computer **(4)**.

Reverse this procedure to install the solid-state drive bracket and connector board.

WLAN module

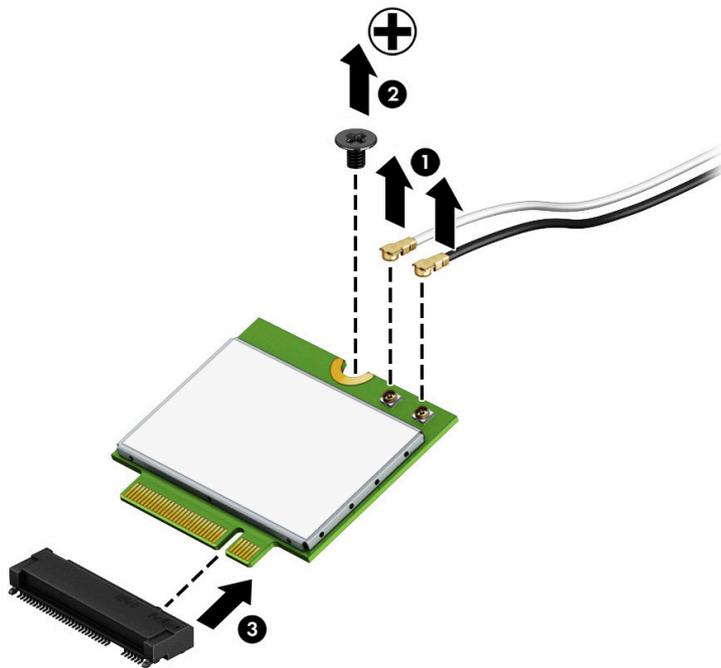| Description	Spare part number
Realtek RTL8822CE 802.11ac 2 × 2 Wi-Fi + Bluetooth 5 Combo Adapter	L44796-005
Intel Wi-Fi 6 AX201, 802.11ax 2 × 2 + Bluetooth 5 (non-vPro, supporting gigabit file transfer speeds)	L57250-005

Before removing the WLAN, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the WLAN module:

1. Disconnect the two antenna cables from the module **(1)**.

2. Remove the Phillips M2.0 × 3.0 screw **(2)**, and then pull the module out of the socket **(3)**.

Reverse this procedure to install the WLAN module.

System board hook

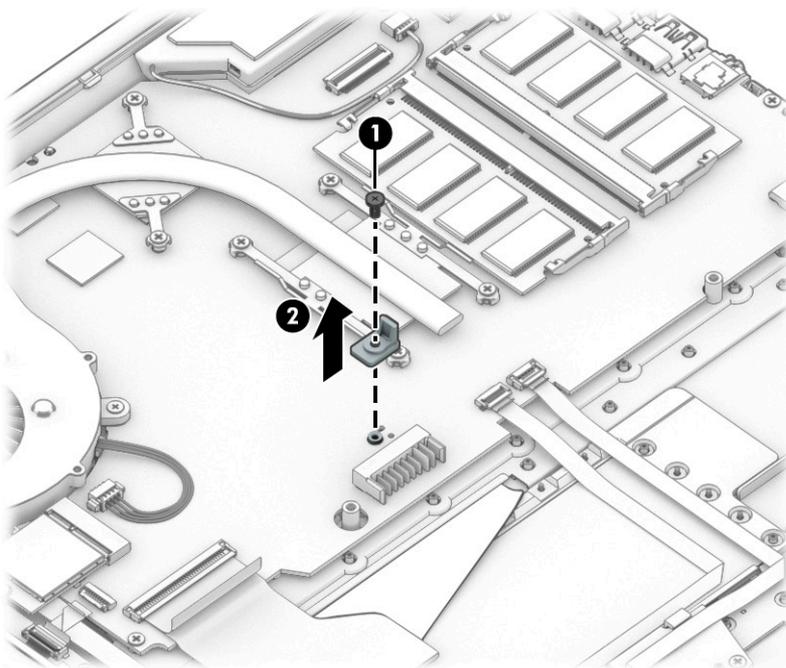**Table 6-8** System board hook description and part number

Description	Spare part number
System board hook	L22748-001

Before removing the system board hook, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the system board hook:

1. Remove the Phillips M2.0 × 3.0 screw **(1)** that secures the hook to the computer.

2. Remove the system board hook from the computer **(2)**.

Reverse this procedure to install the system board hook.

USB board

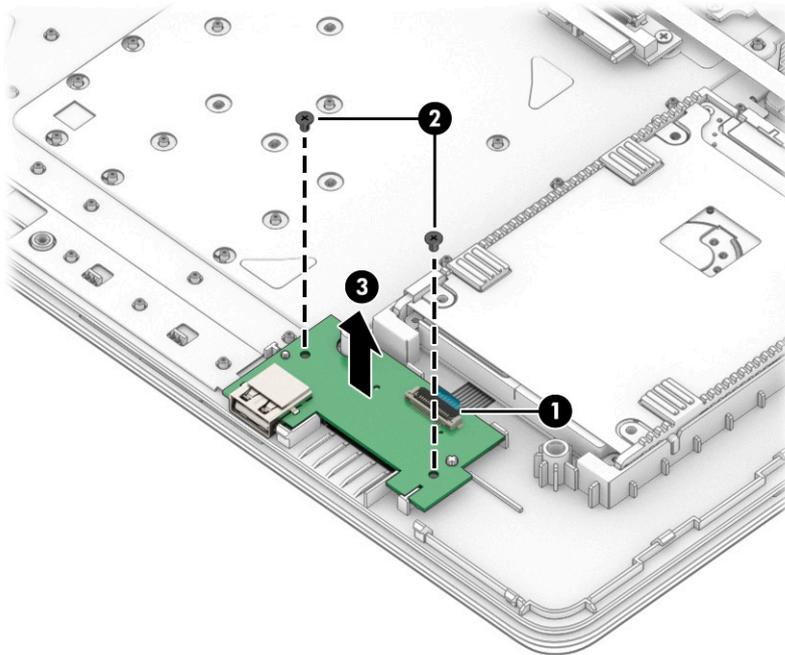| Description	Spare part number
USB board	L22538-001
USB board cable	L22522-001

Before removing the USB board, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the USB board:

1. Disconnect the cable from the ZIF connector on the USB board **(1)**.

2. Remove the two Phillips M2.0 × 3.0 screws **(2)**, and then remove the board from the computer **(3)**.

Reverse this procedure to replace the USB board.

Optical drive board (select products only)

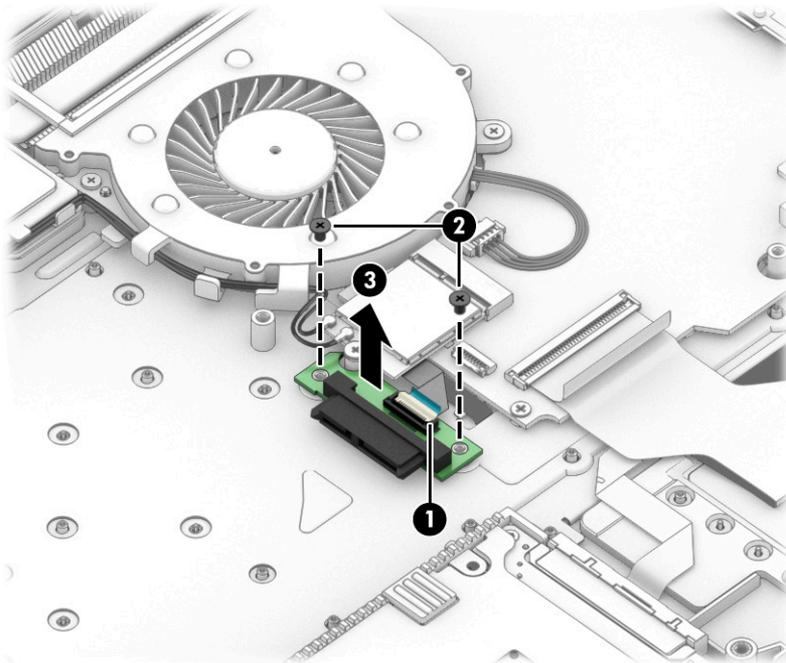**Table 6-10** Optical drive board description and part number

Description	Spare part number
Optical drive board	L22540-001
Optical drive board cable	L22524-001

Before removing the optical drive board, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the optical drive board:

1. Disconnect the cable from the ZIF connector on the optical drive board **(1)**.

2. Remove the two Phillips M2.0 × 3.0 screws **(2)**, and then remove the board from the computer **(3)**.

Reverse this procedure to replace the optical drive board.

Touchpad button board

Table 6-11 Touchpad button board description and part number

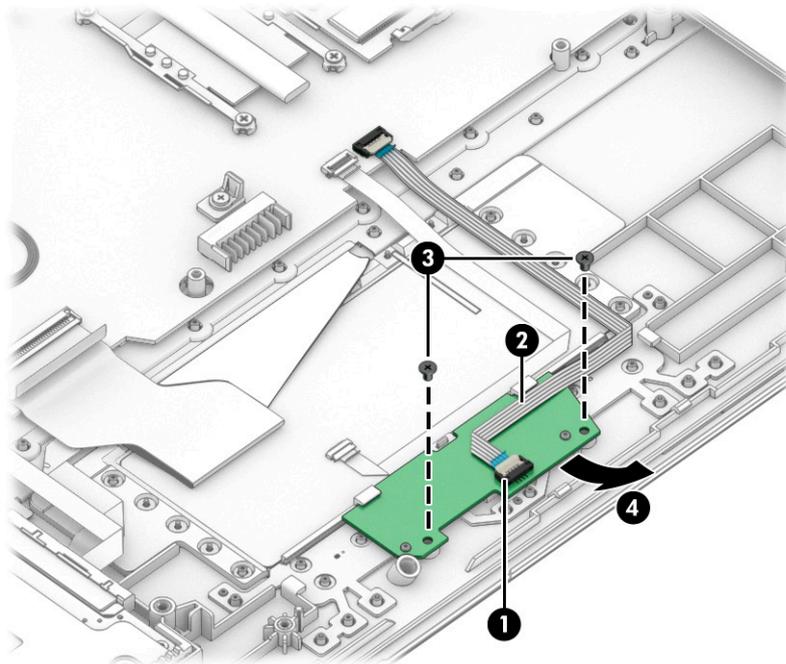| Description	Spare part number
Touchpad button board	L22539-001
Touchpad button board cable	L22523-001

Before removing the touchpad button board, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the touchpad button board:

1. Disconnect the cable from the ZIF connector on the touchpad button board **(1)**.

2. Lift the cable to remove it from the adhesive that secures it to the board **(2)**.

3. Remove the two Phillips M2.0 × 2.0 screws **(3)** that secure the board to the computer.

4. Remove the touchpad button board from the computer **(4)**.

☼ **TIP:** The top edge of the board sits under clips. Be sure to slide the board out from under the clips to prevent damage to the board or clips.

Reverse this procedure to install the touchpad button board.

Touchpad module

| Description	Spare part number
Touchpad module	L22586-001
Touchpad module cable	L22525-001

Before removing the touchpad module, follow these steps:

1.   Prepare the computer for disassembly (Preparation for disassembly on page 25).

2.   Remove the optical drive (see Optical drive (select products only) on page 26).

3.   Remove the bottom cover (see Bottom cover on page 29).

4.   Remove the battery (see Battery on page 31).
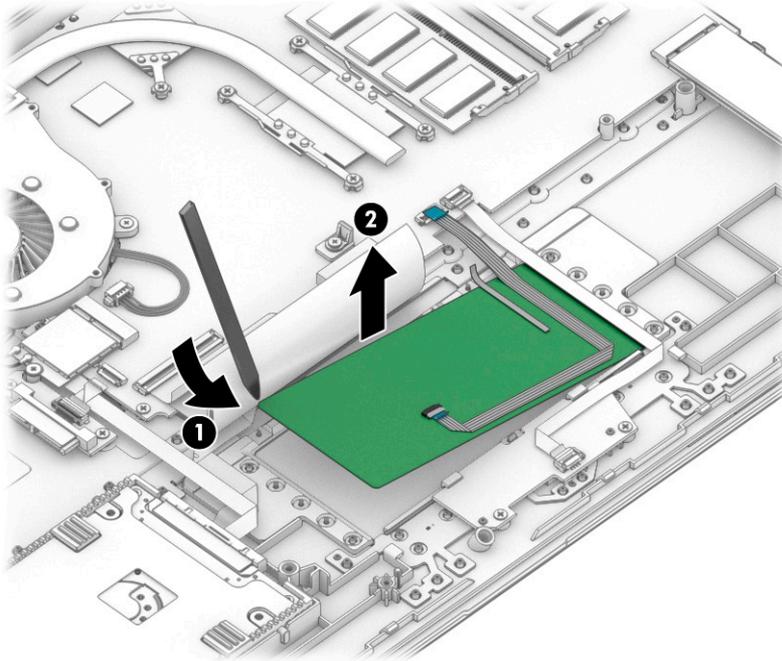
To remove the touchpad module:

1.   Disconnect the cable from the ZIF connector on the touchpad **(1)**.

2.   Lift the tape from the touchpad **(2)**.

3.   Lift the tape up to gain access to the touchpad **(3)**.
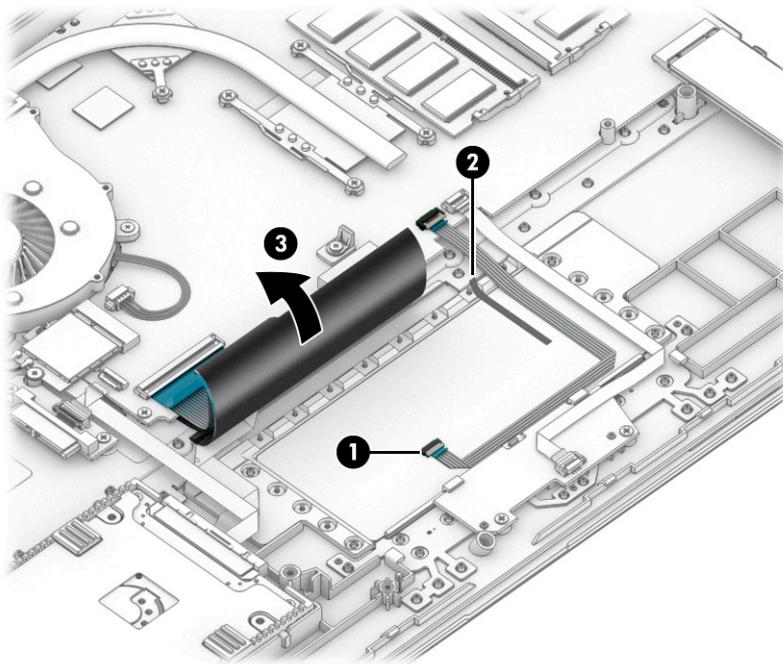
4.   Starting in the corner, use a plastic, nonmarking tool to pry up the touchpad module to disengage the adhesive that secures it to the top cover **(1)**

5. Working around each edge, pry the touchpad module loose, and then remove it from the computer **(2)**.

📝 **NOTE:** The touchpad module might be very tight and difficult to remove.

Reverse this procedure to install the touchpad module.

Power connector cable (DC-in)

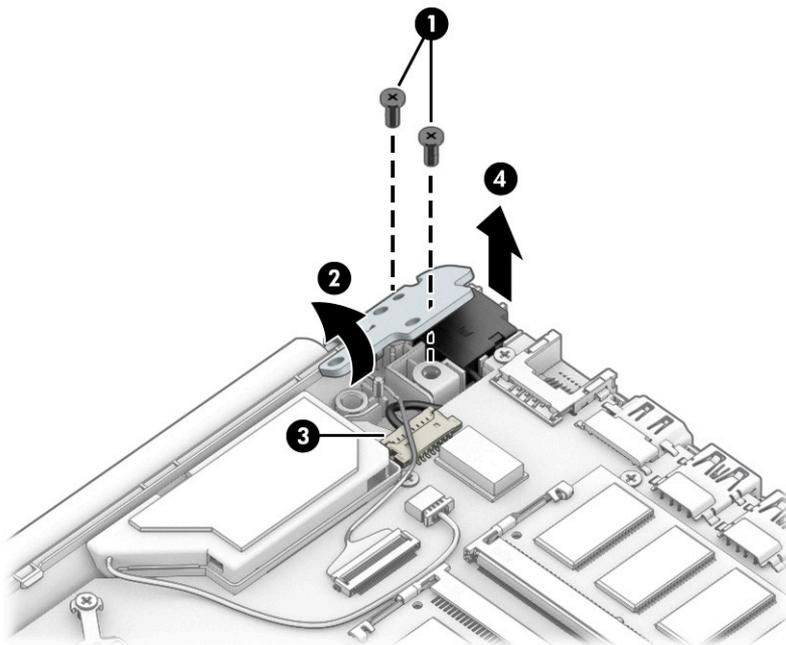**Table 6-13 Power connector cable description and part number**

Description	Spare part number
Power connector cable	L22528-001

Before removing the power connector cable, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the power connector cable:

1. Remove the two Phillips M2.5 × 6.0 screws from the right display hinge **(1)**, and then rotate the hinge up from on top of the power connector **(2)**.

2. Disconnect the power connector cable from the system board **(3)**.

3. Remove the power connector cable from the computer **(4)**.

Reverse this procedure to install the power connector cable.

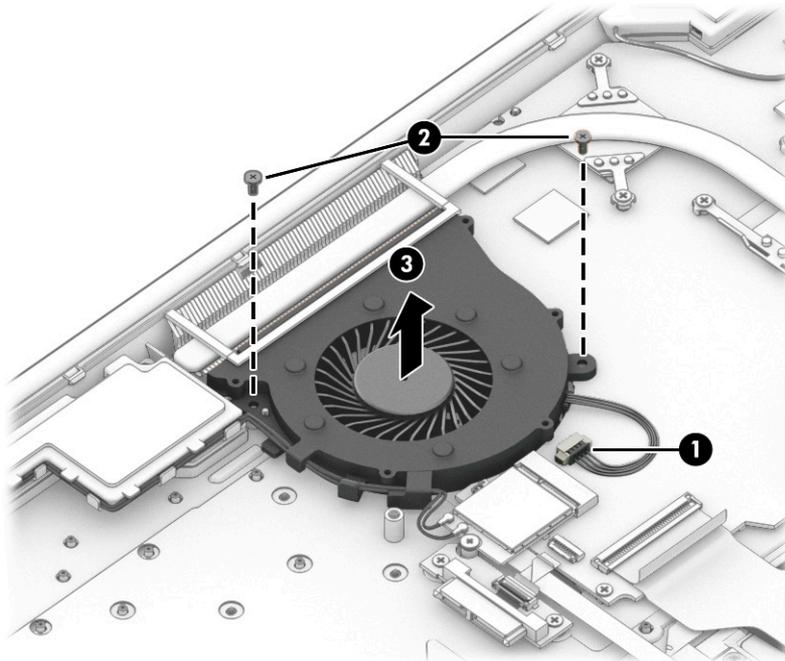# Fan

Table 6-14 Fan description and part number

Description	Spare part number
Fan	L22529-001

Before removing the fan, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the fan:

1. Disconnect the fan cable from the system board **(1)**.

2. Remove the two Phillips M2.5 × 3.0 screws **(2)** that secure the fan to the computer.

3. Lift the fan from the computer **(3)**.

Reverse this procedure to install the fan.

Heat sink assembly

Table 6-15 Heat sink assembly description and part number

| Description	Spare part number
Heat sink	L22531-001

Before removing the heat sink, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

To remove the heat sink assembly:

1. In the order indicated on the heat sink assembly, remove the six Phillips M2.0 × 3.0 screws **(1)** that secure the heat sink to the computer.

2. Lift the heat sink assembly from the computer **(2)**.
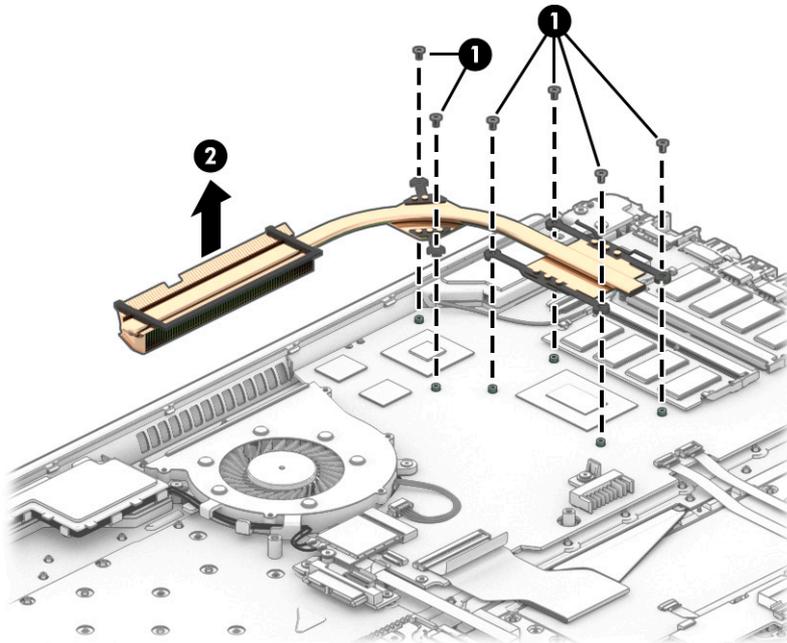
3. Thoroughly clean the thermal material from the surfaces of the heat sink **(2) (4)** and associated system board components **(1) (3)** each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits.
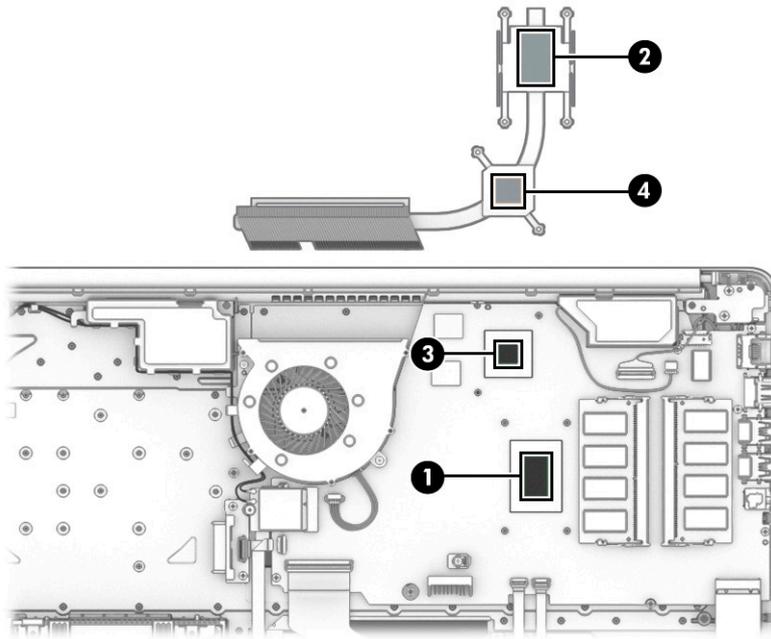
Reverse this procedure to install the heat sink assembly.

System board

NOTE: All system board spare part kits include replacement thermal material.

All system boards use the following part numbers:

xxxxxx-001: Non-Windows operating systems

xxxxxx-601: Windows operating system

Table 6-16 System board description and part number

| Description	Spare part number
Intel Core i7-10510U processor with 2 GB of AMD Radeon 530 graphics memory	L67091-xx1
Intel Core i5-10210U processor with 2 GB of AMD Radeon 530 graphics memory	L67090-xx1
Intel Core i3-10110U processor with 2 GB of AMD Radeon 530 graphics memory	L83735-xx1

Before removing the system board, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the following components:

   a. Optical drive (see Optical drive (select products only) on page 26)

   b. Bottom cover (see Bottom cover on page 29)

   c. Battery (see Battery on page 31)

   d. Memory modules (see Memory on page 33)

   e. Hard drive (see Hard drive on page 35)

   f. Solid-state drive (see Solid-state drive (select products only) on page 38) or Optane memory module (see Optane memory module (select products only) on page 37)

   g. WLAN module (see WLAN module on page 40)

   h. Fan (see Fan on page 48)
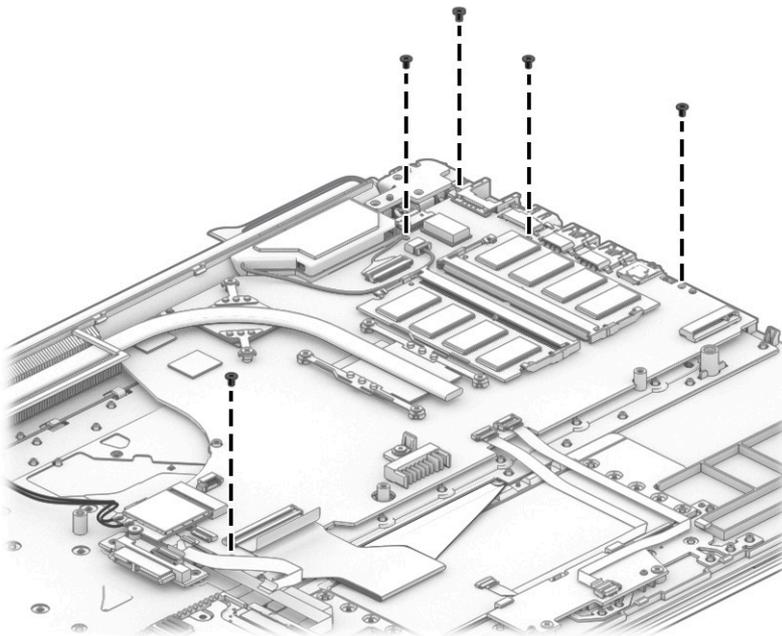
Remove the system board:

IMPORTANT: Make special note of each screw size and location during removal and replacement.

1. Disconnect the following cables from the system board:

   ● Backlight cable **(1)**

   ● Optical drive board cable **(2)** (select products only)

   ● Hard drive cable **(3)**

   ● Keyboard cable **(4)**

   ● Touchpad cable **(5)**

   ● Touchpad button board cable **(6)**
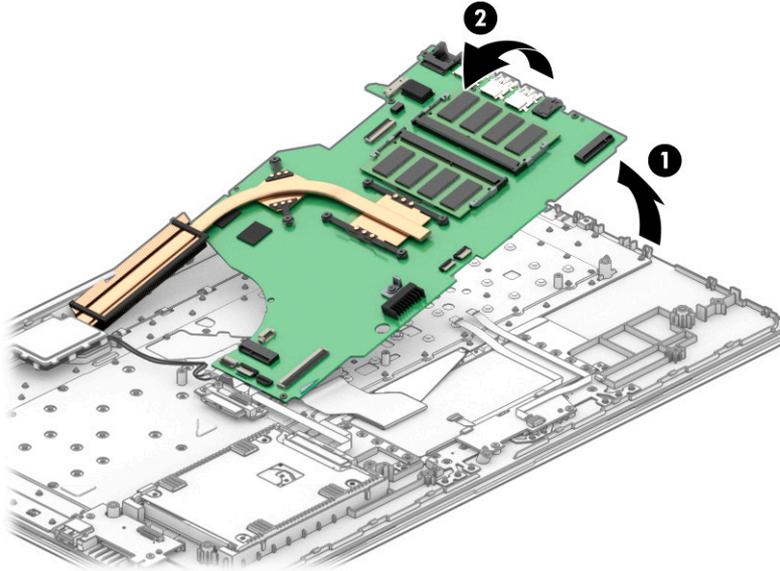
   ● Display cable **(7)**

- Speaker cable **(8)**
- Power connector cable **(9)**
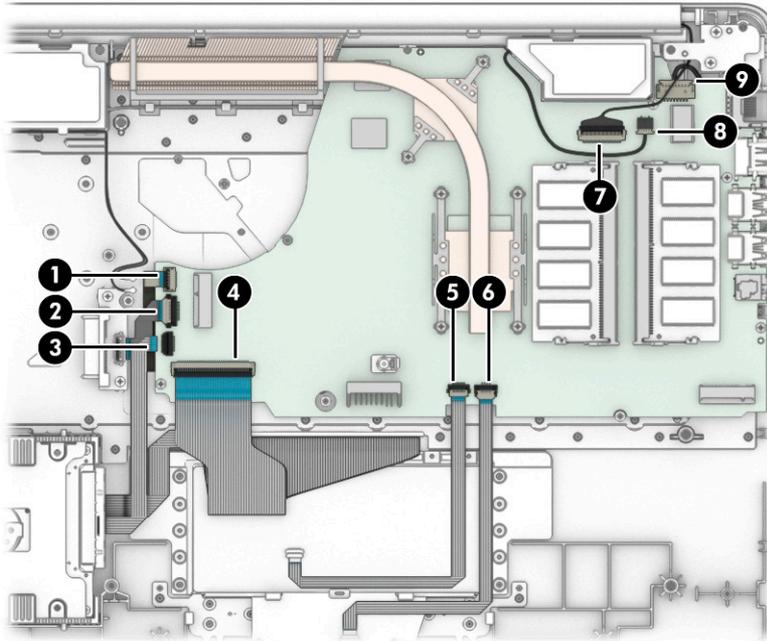
2. Remove the five Phillips M2.0 × 3.0 screws that secure the system board to the computer.

3. Lift the right side of the system board **(1)**, and then turn the system board upside down **(2)** to access the connector underneath.

4. Disconnect the USB board cable from the ZIF connector on the system board **(1)**, and then remove the system board from the computer **(2)**.
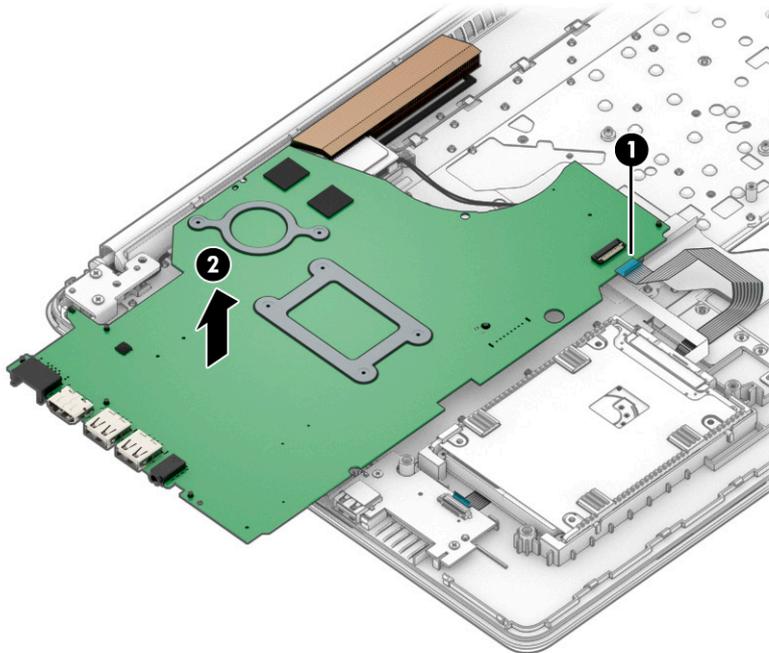
Reverse this procedure to install the system board.

Speakers

**Table 6-17 Speakers description and part number**

Description	Spare part number
Speaker Kit	L22580-001

Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

5. Remove the system board (see System board on page 51).

Remove the speakers:

1. Remove the antenna cables from the clips in the left speaker **(1)**.

2. Remove the speaker cable from the clips built into the computer **(2)**, and then remove the speakers from the computer **(3)**.
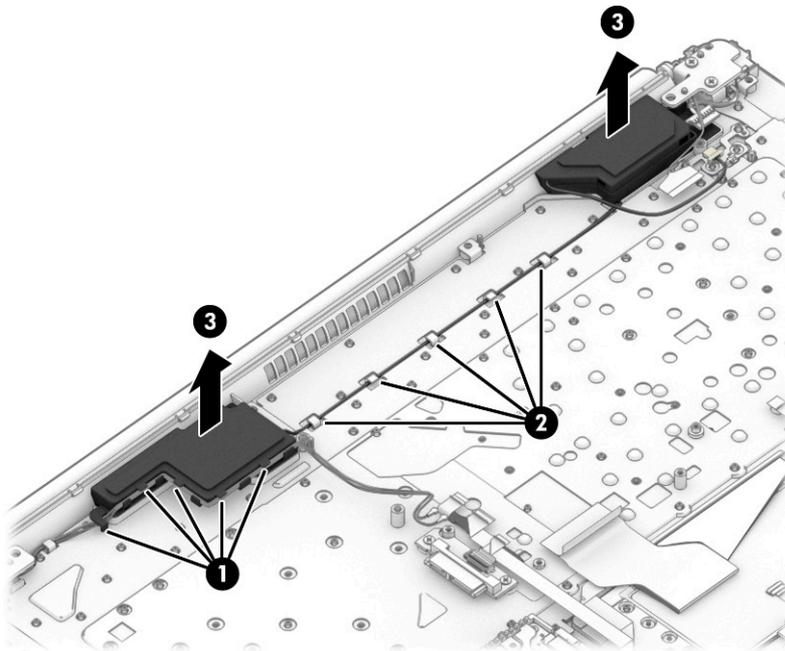
Reverse this procedure to install the speakers.
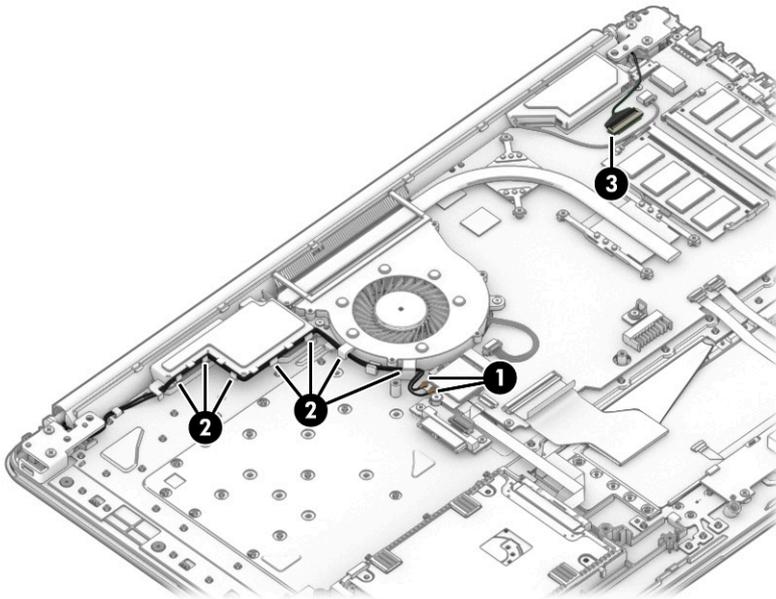
Display assembly

Full hinge-up displays are not available as spare parts. Spare parts for displays are available only at the subcomponent level.

Before removing the display panel, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 25).

2. Remove the optical drive (see Optical drive (select products only) on page 26).

3. Remove the bottom cover (see Bottom cover on page 29).

4. Remove the battery (see Battery on page 31).

Remove the display assembly:

1. Disconnect the antenna cables from the WLAN module **(1)**.

2. Remove the antenna cables from the clips in the speaker and fan **(2)**.

3. Disconnect the display cable from the system board **(3)**.

4. Remove the four Phillips M2.5 × 6.0 screws **(1)** from the display hinges.

5. Rotate the hinges upward **(2)**.

6. Separate the display from the computer **(3)**.
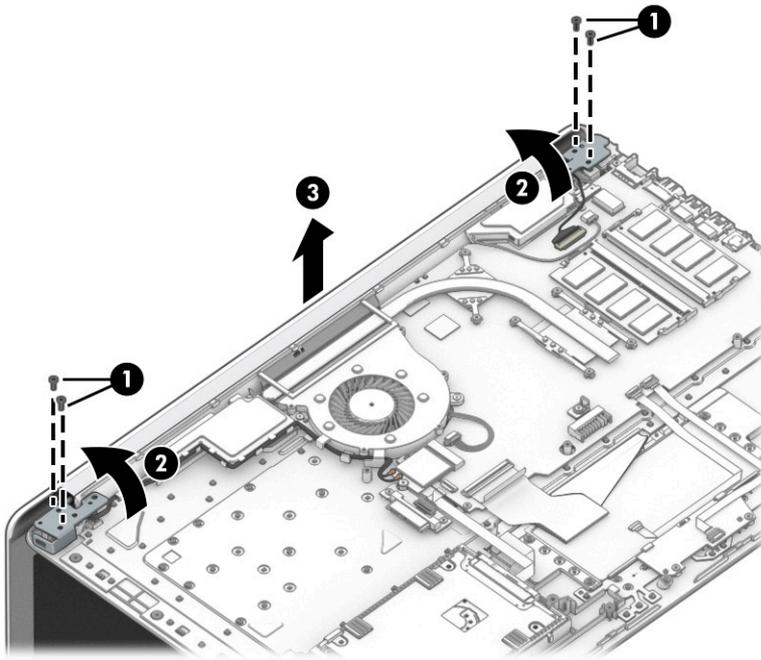
Remove the display assembly subcomponents:

1. If it is necessary to replace the display bezel:

a. If you need to remove the display bezel, flex the top **(1)** of the bezel, the inside edges of the left and right sides **(2)**, and then the bottom **(3)** of the bezel until it disengages from the display enclosure.

b. Remove the bezel **(4)**.

The display bezel is available as spare part number L22517-001.
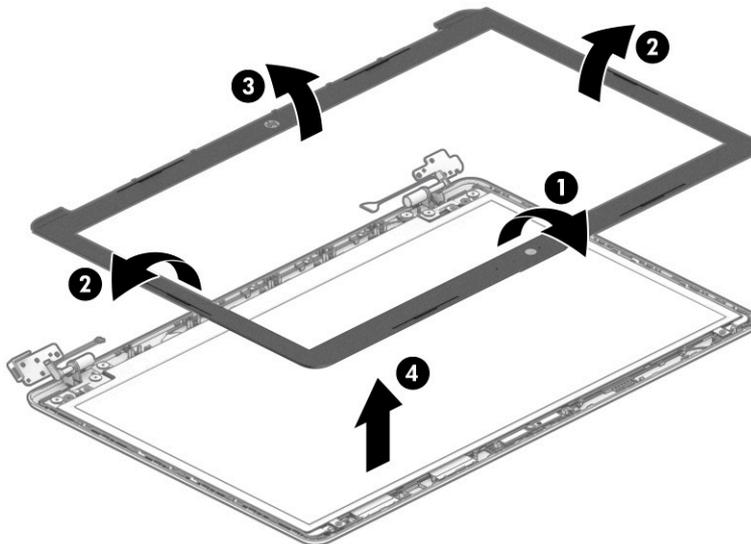
2. If it is necessary to replace the camera/microphone module:

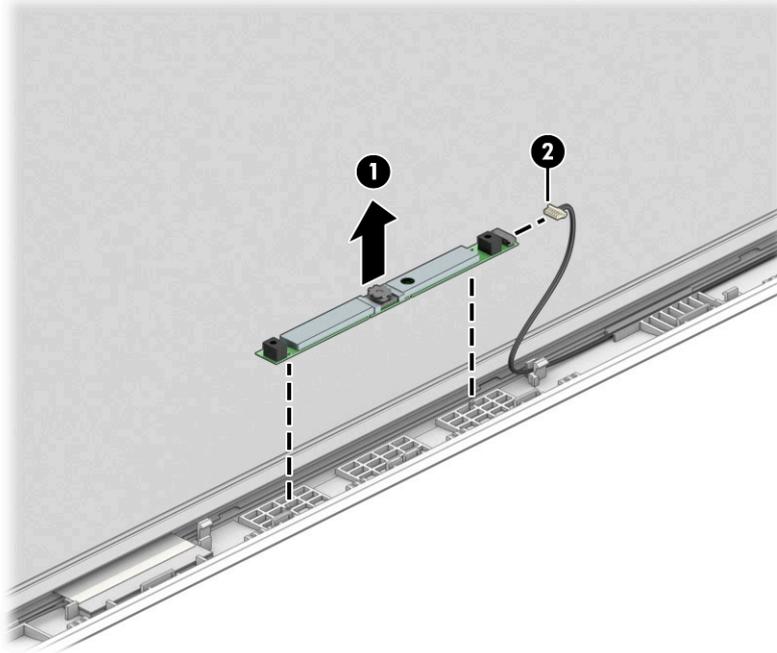**a.** Detach the camera module **(1)** from the display back cover. (The module is attached with double-sided adhesive.)

b. Disconnect the cable **(2)** from the camera/microphone module.

The HD camera module is available as spare part number L22587-001.

3. If it is necessary to replace the display panel:

a. Remove the four Phillips M2.0 × 3.0 screws that secure the panel to the display enclosure.
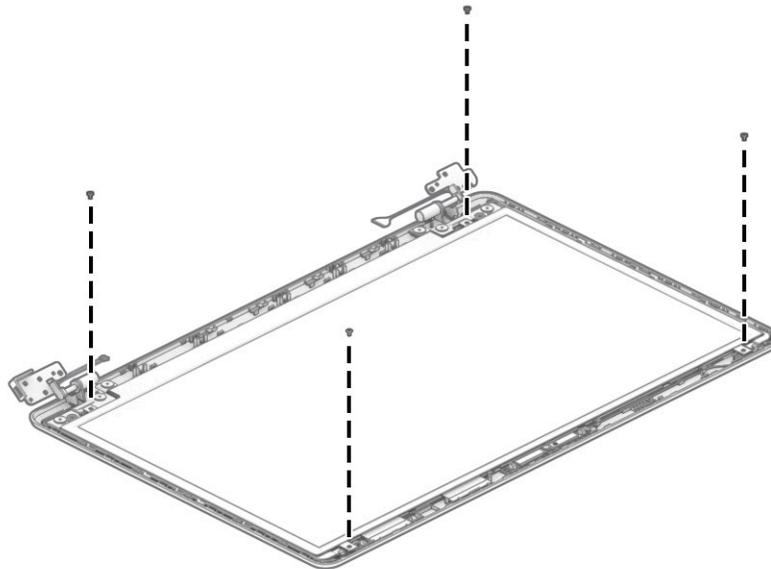
b. Swing the top edge of the display panel forward and position the panel upside down next to the display enclosure **(1)**.

c. Release the tape **(2)** that secures the display panel cable connector to the display panel.

d. Disconnect the display panel cable **(3)** from the display panel.
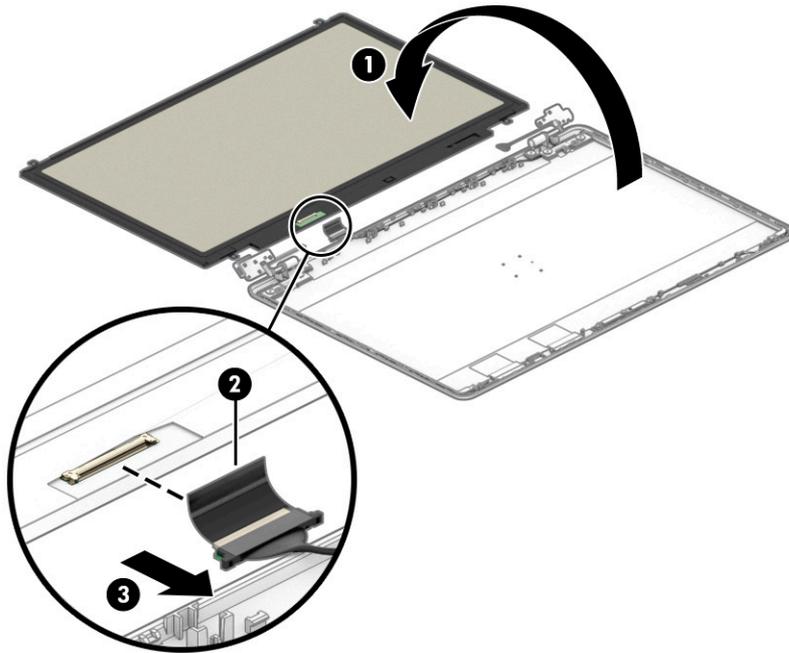
e. Remove the display panel.

Raw display panels are available using the following spare part numbers:

L83733-001: FHD panel

L83734-001: HD+ panel

4. If it is necessary to replace the hinge cover, pull either side of hinge cover to disengage it from the display enclosure, and then remove the hinge cover from the display enclosure.

The hinge cover is available as spare part number L83730-001.
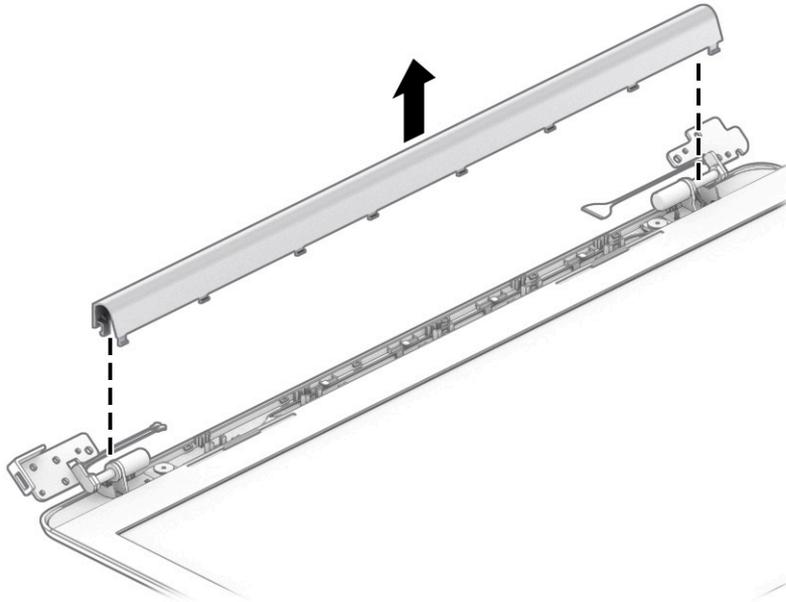

When replacing the hinge cover, make sure the hinges rotate downward as far as they can go. Align the cover, and then start from above and rotate the cover downward onto the hinges. Make sure the clips snap into place along the bottom of the display cover.

5. If it is necessary to replace the display hinges:

a. Remove the six Phillips M2.5 × 2.5 broad head screws **(1)** from the bottom of the hinges.

b. Remove the display hinges **(2)**.

The display hinges are available as spare part number L22536-001.
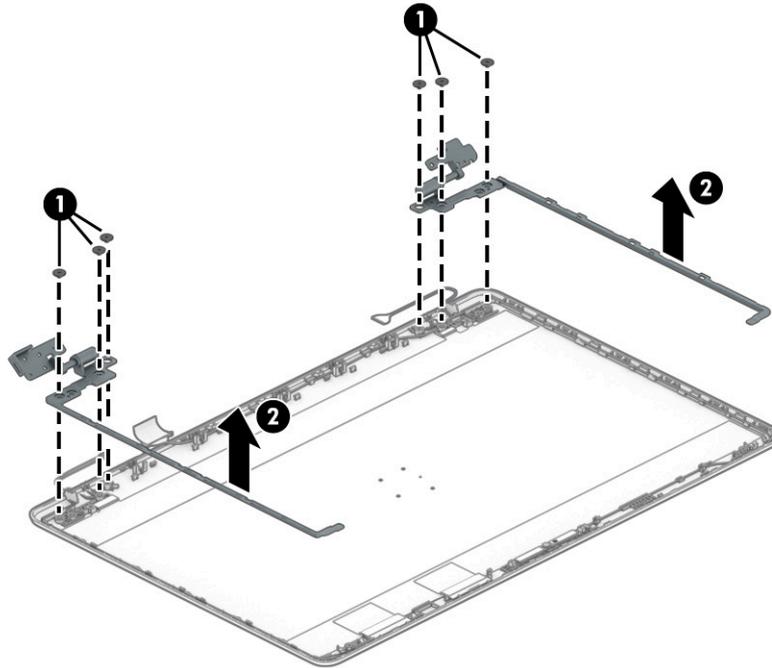
6. If it is necessary to replace the display panel cable:

a. Release the cable from the retention clips and routing channel built into the bottom edge and side of the display enclosure **(1)**.

b. Remove the display panel cable **(2)**.

The display panel cable is available using the following spare part numbers:

L22519-001: HD display

L22520-001: FHD display
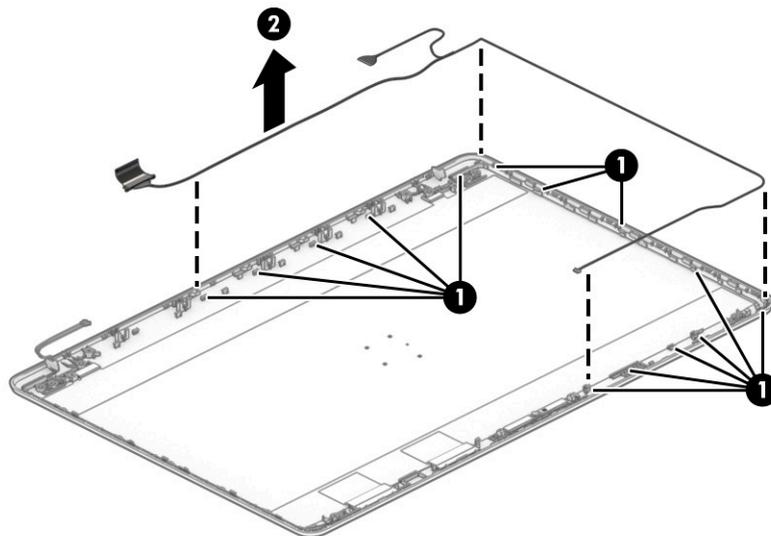
7. If it is necessary to replace the wireless antenna cables and transceivers:

   a. Release the wireless antenna cables from the retention clips and routing channel built into the sides of the display enclosure **(1)**.

   b. Release the antenna from the display enclosure **(2)**.

      Antennas are available as spare part number L22497-001.
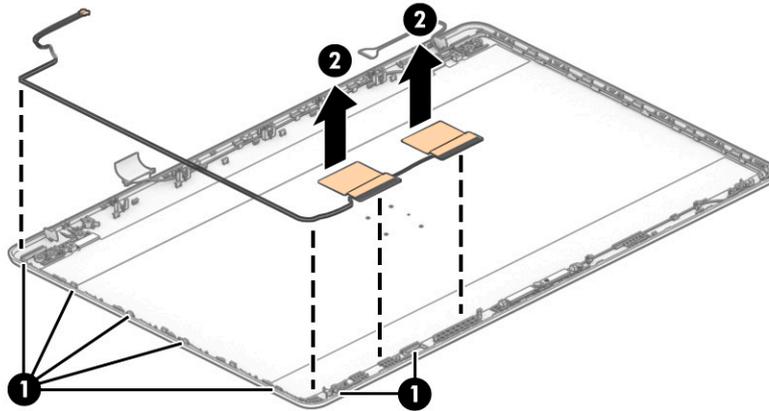
Use the following image to determine proper cable routing in the display of the antenna cable **(1)** and display cable **(2)**.
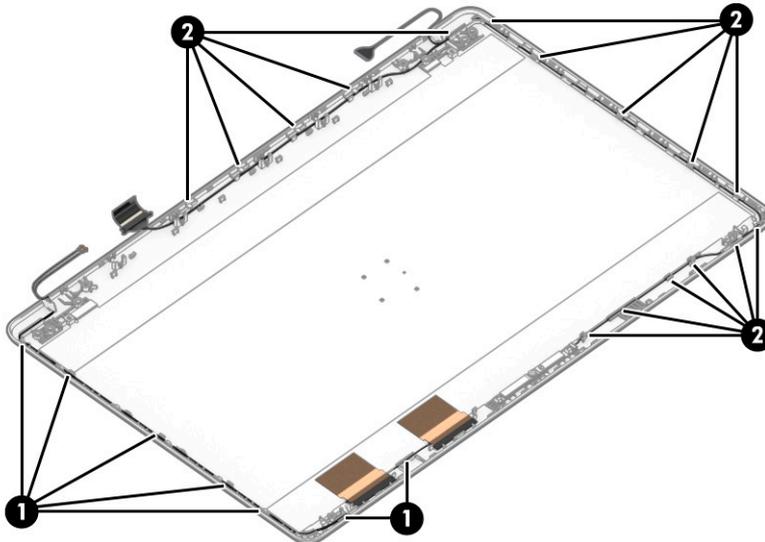
The display rear cover is available as spare part number L83724-001.

Reverse these procedures to reassemble and install the display assembly components.

Top cover with keyboard

The top cover with keyboard remains after removing all other spare parts from the computer.

In this section, the first table provides the main spare part number for the keyboards. The second table provides the country codes.

Table 6-18 Top cover with keyboard description and part number

Description	Spare part number
Keyboard, backlit, models without an optical drive	L83727-xx1
Keyboard, no backlight, models with an optical drive	L83728-xx1
Keyboard, backlit, models with an optical drive	L91024-xx1
Keyboard, no backlight, models without an optical drive	L91025-xx1

Table 6-19 Keyboard country codes

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	Israel	-BB1	South Korea	-AD1
Canada	-DB1	Italy	-061	Spain	-071
Czech Republic and Slovakia	-FL1	The Netherlands	-B31	Switzerland	-BG1
Denmark, Finland, and Norway	-DH1	Portugal	-131	Taiwan	-AB1
France	-051	Russia	-251	United Kingdom	-031
Germany	-041	Slovenia	-BA1	United States	-001
Hungary	-211				

7 Using Setup Utility (BIOS)

Setup Utility, or Basic Input/Output System (BIOS), controls communication between all the input and output devices on the system (such as disk drives, display, keyboard, mouse, and printer). Setup Utility (BIOS) includes settings for the types of devices installed, the startup sequence of the computer, and the amount of system and extended memory.

NOTE: To start Setup Utility on convertible computers, your computer must be in notebook mode and you must use the keyboard attached to your notebook.

Starting Setup Utility (BIOS)

IMPORTANT: Use extreme care when making changes in Setup Utility (BIOS). Errors can prevent the computer from operating properly.

▲ Turn on or restart the computer and quickly press f10.

– or –

Turn on or restart the computer, quickly press esc, and then press f10 when the Start menu is displayed.

Updating Setup Utility (BIOS)

Updated versions of Setup Utility (BIOS) might be available on the HP website.

Most BIOS updates on the HP website are packaged in compressed files called *SoftPaqs*.

Some download packages contain a file named Readme.txt, which contains information regarding installing and troubleshooting the file.

Determining the BIOS version

To decide whether you need to update Setup Utility (BIOS), first determine the BIOS version on your computer.

To reveal the BIOS version information (also known as *ROM date* and *System BIOS*), use one of these options.

- HP Support Assistant

   1. Type support in the taskbar search box, and then select the **HP Support Assistant** app.

      – or –

      Select the question mark icon in the taskbar.

   2. Select **My notebook**, and then select **Specifications**.

- Setup Utility (BIOS)

   1. Start Setup Utility (BIOS) (see).

   2. Select **Main**, and then make note of the BIOS version.

   3. Select **Exit**, select one of the options, and then follow the on-screen instructions.

- In Windows, press ctrl+alt+s.

To check for later BIOS versions, see .

Downloading a BIOS update

IMPORTANT: To reduce the risk of damage to the computer or an unsuccessful installation, download and install a BIOS update only when the computer is connected to reliable external power using the AC adapter. Do not download or install a BIOS update while the computer is running on battery power, docked in an optional docking device, or connected to an optional power source. During the download and installation, follow these instructions:

- Do not disconnect power from the computer by unplugging the power cord from the AC outlet.

- Do not shut down the computer or initiate Sleep.

- Do not insert, remove, connect, or disconnect any device, cable, or cord.

NOTE: If your computer is connected to a network, consult the network administrator before installing any software updates, especially system BIOS updates.

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

   – or –

   Select the question mark icon in the taskbar.

2. Select **Updates**, and then select **Check for updates and messages**.

3. Follow the on-screen instructions.

4. At the download area, follow these steps:

   a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. If the update is more recent than your BIOS version, make a note of the date, name, or other identifier. You might need this information to locate the update later, after it has been downloaded to your hard drive.

   b. Follow the on-screen instructions to download your selection to the hard drive.

      Make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.

BIOS installation procedures vary. Follow any instructions that appear on the screen after the download is complete. If no instructions appear, follow these steps:

1. Type `file` in the taskbar search box, and then select **File Explorer**.

2. Select your hard drive designation. The hard drive designation is typically Local Disk (C:).

3. Using the hard drive path you recorded earlier, open the folder that contains the update.

4. Double-click the file that has an .exe extension (for example, *filename*.exe).

   The BIOS installation begins.

5. Complete the installation by following the on-screen instructions.

NOTE: After a message on the screen reports a successful installation, you can delete the downloaded file from your hard drive.

8 Using HP PC Hardware Diagnostics

Using HP PC Hardware Diagnostics Windows (select products only)

HP PC Hardware Diagnostics Windows is a Windows-based utility that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs within the Windows operating system to diagnose hardware failures.

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see Downloading HP PC Hardware Diagnostics Windows on page 65.

After HP PC Hardware Diagnostics Windows is installed, follow these steps to access it from HP Help and Support or HP Support Assistant.

1. To access HP PC Hardware Diagnostics Windows from HP Help and Support:

    a. Select the **Start** button, and then select **HP Help and Support**.

    b. Select **HP PC Hardware Diagnostics Windows**.

    – or –

    To access HP PC Hardware Diagnostics Windows from HP Support Assistant:

    a. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

        – or –

        Select the question mark icon in the taskbar.

    b. Select **Troubleshooting and fixes**.

    c. Select **Diagnostics**, and then select **HP PC Hardware Diagnostics Windows**.

2. When the tool opens, select the type of diagnostic test that you want to run, and then follow the on-screen instructions.

    NOTE: To stop a diagnostic test, select **Cancel**.

When HP PC Hardware Diagnostics Windows detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. The screen displays one of the following options:

- A Failure ID link is displayed. Select the link and follow the on-screen instructions.

- Instructions for calling support are displayed. Follow those instructions.

Downloading HP PC Hardware Diagnostics Windows

- The HP PC Hardware Diagnostics Windows downloading instructions are provided in English only.

- You must use a Windows computer to download this tool because only .exe files are provided.

Downloading the latest HP PC Hardware Diagnostics Windows version

To download HP PC Hardware Diagnostics Windows, follow these steps:

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. Select **Download HP Diagnostics Windows**, and then select a location on your computer or a USB flash drive.

The tool downloads to the selected location.

– or –

You can use the following steps to download the HP PC Hardware Diagnostics Windows from the Microsoft Store:

1. Select the Microsoft app on your desktop or enter `Microsoft Store` in the taskbar search box.

2. Enter `HP PC Hardware Diagnostics Windows` in the **Microsoft Store** search box.

3. Follow the on-screen directions.

The tool downloads to the selected location.

Downloading HP Hardware Diagnostics Windows by product name or number (select products only)

📝 **NOTE:** For some products, you might have to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics Windows by product name or number, follow these steps:

1. Go to http://www.hp.com/support.

2. Select **Get software and drivers**, select your type of product, and then enter the product name or number in the search box that is displayed.

3. In the **Diagnostics** section, select **Download**, and then follow the on-screen instructions to select the specific Windows diagnostics version to be downloaded to your computer or USB flash drive.

The tool downloads to the selected location.

Installing HP PC Hardware Diagnostics Windows

To install HP PC Hardware Diagnostics Windows, follow these steps:

▲ Navigate to the folder on your computer or the USB flash drive where the .exe file downloaded, double-click the .exe file, and then follow the on-screen instructions.

Using HP PC Hardware Diagnostics UEFI

📝 **NOTE:** For Windows 10 S computers, you must use a Windows computer and a USB flash drive to download and create the HP UEFI support environment because only .exe files are provided. For more information, see .

HP PC Hardware Diagnostics UEFI (Unified Extensible Firmware Interface) allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs outside the operating system so that it can isolate hardware failures from issues that are caused by the operating system or other software components.

If your PC does not start in Windows, you can use HP PC Hardware Diagnostics UEFI to diagnose hardware issues.

When HP PC Hardware Diagnostics UEFI detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. For assistance in solving the problem:

▲ Select **Contact HP**, accept the HP privacy disclaimer, and then use a mobile device to scan the Failure ID code that appears on the next screen. The HP Customer Support - Service Center page appears with your Failure ID and product number automatically filled in. Follow the on-screen instructions.

– or –

Contact support, and provide the Failure ID code.

📝 **NOTE:** To start diagnostics on a convertible computer, your computer must be in notebook mode, and you must use the attached keyboard.

📝 **NOTE:** If you need to stop a diagnostic test, press esc.

Starting HP PC Hardware Diagnostics UEFI

To start HP PC Hardware Diagnostics UEFI, follow these steps:

1. Turn on or restart the computer, and quickly press esc.

2. Press f2.

   The BIOS searches three places for the diagnostic tools, in the following order:

   a. Connected USB flash drive

      📝 **NOTE:** To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see .

   b. Hard drive

   c. BIOS

3. When the diagnostic tool opens, select a language, select the type of diagnostic test you want to run, and then follow the on-screen instructions.

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive can be useful in the following situations:

● HP PC Hardware Diagnostics UEFI is not included in the preinstallation image.

● HP PC Hardware Diagnostics UEFI is not included in the HP Tool partition.

● The hard drive is damaged.

📝 **NOTE:** The HP PC Hardware Diagnostics UEFI downloading instructions are provided in English only, and you must use a Windows computer to download and create the HP UEFI support environment because only .exe files are provided.

Downloading the latest HP PC Hardware Diagnostics UEFI version

To download the latest HP PC Hardware Diagnostics UEFI version to a USB flash drive:

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. Select **Download HP Diagnostics UEFI**, and then select **Run**.

Downloading HP PC Hardware Diagnostics UEFI by product name or number (select products only)

NOTE: For some products, you might have to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics UEFI by product name or number (select products only) to a USB flash drive:

1. Go to http://www.hp.com/support.

2. Enter the product name or number, select your computer, and then select your operating system.

3. In the **Diagnostics** section, follow the on-screen instructions to select and download the specific UEFI Diagnostics version for your computer.

Using Remote HP PC Hardware Diagnostics UEFI settings (select products only)

Remote HP PC Hardware Diagnostics UEFI is a firmware (BIOS) feature that downloads HP PC Hardware Diagnostics UEFI to your computer. It can then execute the diagnostics on your computer, and it might upload results to a preconfigured server. For more information about Remote HP PC Hardware Diagnostics UEFI, go to http://www.hp.com/go/techcenter/pcdiags, and then select **Find out more**.

Downloading Remote HP PC Hardware Diagnostics UEFI

NOTE: HP Remote PC Hardware Diagnostics UEFI is also available as a SoftPaq that you can download to a server.

Downloading the latest Remote HP PC Hardware Diagnostics UEFI version

To download the latest Remote HP PC Hardware Diagnostics UEFI version, follow these steps:

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. Select **Download Remote Diagnostics**, and then select **Run**.

Downloading Remote HP PC Hardware Diagnostics UEFI by product name or number

NOTE: For some products, you might have to download the software by using the product name or number.

To download HP Remote PC Hardware Diagnostics UEFI by product name or number, follow these steps:

1. Go to http://www.hp.com/support.

2. Select **Get software and drivers**, select your type of product, enter the product name or number in the search box that is displayed, select your computer, and then select your operating system.

3. In the **Diagnostics** section, follow the on-screen instructions to select and download the **Remote UEFI** version for the product.

Customizing Remote HP PC Hardware Diagnostics UEFI settings

Using the Remote HP PC Hardware Diagnostics setting in Computer Setup (BIOS), you can perform the following customizations:

- Set a schedule for running diagnostics unattended. You can also start diagnostics immediately in interactive mode by selecting **Execute Remote HP PC Hardware Diagnostics**.

- Set the location for downloading the diagnostic tools. This feature provides access to the tools from the HP website or from a server that has been preconfigured for use. Your computer does not require the traditional local storage (such as a hard drive or USB flash drive) to run remote diagnostics.

- Set a location for storing the test results. You can also set the user name and password that you use for uploads.

- Display status information about the diagnostics run previously.

To customize Remote HP PC Hardware Diagnostics UEFI settings, follow these steps:

1. Turn on or restart the computer, and when the HP logo appears, press f10 to enter Computer Setup.

2. Select **Advanced**, and then select **Settings**.

3. Make your customization selections.

4. Select **Main**, and then **Save Changes and Exit** to save your settings.

Your changes take effect when the computer restarts.

9 Backing up, restoring, and recovering

This chapter provides information about the following processes, which are standard procedure for most products:

- **Backing up your personal information**—You can use Windows tools to back up your personal information (see Using Windows tools on page 70).

- **Creating a restore point**—You can use Windows tools to create a restore point (see Using Windows tools on page 70).

- **Creating recovery media** (select products only)—You can use the HP Cloud Recovery Download Tool (select products only) to create recovery media (see Using the HP Cloud Recovery Download Tool to create recovery media (select products only) on page 70).

- **Restoring and recovery**—Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state (see Using Windows tools on page 70).

IMPORTANT: If you will be performing recovery procedures on a tablet, the tablet battery must be at least 70% charged before you start the recovery process.

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning any recovery process.

Backing up information and creating recovery media

Using Windows tools

IMPORTANT: Windows is the only option that allows you to back up your personal information. Schedule regular backups to avoid information loss.

You can use Windows tools to back up personal information and create system restore points and recovery media.

NOTE: If computer storage is 32 GB or less, Microsoft System Restore is disabled by default.

For more information and steps, see the Get Help app.

1. Select the **Start** button, and then select the **Get Help** app.

2. Enter the task you want to perform.

NOTE: You must be connected to the Internet to access the Get Help app.

Using the HP Cloud Recovery Download Tool to create recovery media (select products only)

You can use the HP Cloud Recovery Download Tool to create HP Recovery media on a bootable USB flash drive.

For details:

▲ Go to http://www.hp.com/support, search for HP Cloud Recovery, and then select the result that matches the type of computer that you have.

NOTE: If you cannot create recovery media yourself, contact support to obtain recovery discs. Go to http://www.hp.com/support, select your country or region, and then follow the on-screen instructions.

Restoring and recovery

Restoring, resetting, and refreshing using Windows tools

Windows offers several options for restoring, resetting, and refreshing the computer. For details, see Using Windows tools on page 70.

Recovering using HP Recovery media

You can use HP Recovery media to recover the original operating system and software programs that were installed at the factory. On select products, it can be created on a bootable USB flash drive using the HP Cloud Recovery Download Tool. For details, see Using the HP Cloud Recovery Download Tool to create recovery media (select products only) on page 70.

NOTE: If you cannot create recovery media yourself, contact support to obtain recovery discs. Go to http://www.hp.com/support, select your country or region, and then follow the on-screen instructions.

To recover your system:

▲ Insert the HP Recovery media, and then restart the computer.

Changing the computer boot order

If your computer does not restart using the HP Recovery media, you can change the computer boot order. This is the order of devices listed in BIOS where the computer looks for startup information. You can change the selection to an optical drive or a USB flash drive, depending on the location of your HP Recovery media.

To change the boot order:

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps.

1. Insert the HP Recovery media.

2. Access the system **Startup** menu.

   For computers or tablets with keyboards attached:

   ▲ Turn on or restart the computer or tablet, quickly press esc, and then press f9 for boot options.

   For tablets without keyboards:

   ▲ Turn on or restart the tablet, quickly hold down the volume up button, and then select **f9**.

      – or –

      Turn on or restart the tablet, quickly hold down the volume down button, and then select **f9**.

3. Select the optical drive or USB flash drive from which you want to boot, and then follow the on-screen instructions.

Using HP Sure Recover (select products only)

Select computer models are configured with HP Sure Recover, a PC OS recovery solution built into the hardware and firmware. HP Sure Recover can fully restore the HP OS image without installed recovery software.

Using HP Sure Recover, an administrator or user can restore the system and install:

● Latest version of the operating system

● Platform-specific device drivers

● Software applications, in the case of a custom image

To access the latest documentation for HP Sure Recover, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.

10 Specifications

Computer specifications

Table 10-1 Computer specifications

	Metric	U.S.
Dimensions		
Length	272.2 mm	10.72 in
Width	414.8 mm	16.33 in
Height	24.5 mm	0.97 in
Weight (lowest configuration)	2.45 kg	5.21 lbs
HDD: add 36.6 g (0.08 lbs)		
HDD + SSD: add 44.6 g (0.10 lbs)		
Fan: add 65.6 g (0.14 lbs)		
Input power		
Operating voltage	19.0 V dc @ 4.74 A – 90 W or 18.5 V dc @ 3.5 A - 65 W or 45 W	
Operating current	4.74 A or 3.5 A	
Temperature		
Operating (not writing to optical disc)	0°C to 35°C	32°F to 95°F
Operating (writing to optical disc)	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity		
Operating	10% to 90%	
Nonoperating	5% to 95%	

NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The computer operates well within this range of temperatures.

43.9 cm (17.3 in) display specifications

Table 10-2 Display specifications

	Metric	U.S.
Active diagonal size	43.9 cm	17.3 in
Resolution	FHD: 1920 × 1080	
	HD+: 1600 × 900	
Surface treatment	Antiglare	
Brightness	220 nits (HD+)	
	300 nits (FHD)	
Viewing angle	SVA (HD+ panels)	
	UWVA (FHD panels)	
Backlight	LED	
Aspect ratio	16:9	
Display panel interface	eDP	

M.2 SATA solid-state drive specifications

Table 10-3 M.2 SATA solid-state drive specifications

	128-GB*
Height	1.35 mm
Weight	< 10 g
Form factor	M.2 2280-D2-B-M
Transfer rate	up to 540 MB/sec
Interface type	SATA-3
Ready time, maximum (to not busy)	1.0 ms
Access times, logical	0.1 ms
Total logical sectors	234,441,648
Operating temperature	0°C to 70°C (32°F to 158°F)

*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.

NOTE: Certain restrictions and exclusions apply. Contact technical support for details.

M.2 PCIe solid-state drive specifications

Table 10-4 M.2 PCIe solid-state drive specifications

	256-GB*	512-GB*
Dimensions		
Height	1 mm	1 mm
Length	50.8 mm	50.8 mm
Width	28.9 mm	28.9 mm
Weight	< 10 g	< 10 g
Interface type	ATA-7	ATA-7
Transfer rate		
Sequential Read	Up to 2150 MB/s	Up to 2150 MB/s
Random Read	Up to 300,000 IOPs	Up to 300,000 IOPs
Sequential Write	Up to 1260 MB/s	Up to 1550 MB/s
Random Write	Up to 100,000 IOPs	Up to 100,000 IOPs
Ready time, Maximum (to not busy)	1.0 s	1.0 s
Access times		
Logical	0.1 ms	0.1 ms
Total logical sectors	500,118,192	1,000,215,216
Operating temperature		
Operating	0° to 70°C (32°F to 158°F)	0° to 70°C (32°F to 158°F)
Non-operating	-40° to 80°C (-40°F to 176°F)	-40° to 85°C (-40°F to 185°F)

*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.

NOTE: Certain restrictions and exclusions apply. Contact technical support for details.

Hard drive specifications

Table 10-5 M.2 Hard drive specifications

	2-TB*	1-TB*	500-GB*
Dimensions			
Height	7.2 mm or 9.5 mm	7.2 mm or 9.5 mm	7.0 mm
Length	100.4 mm	100.4 mm	100.6 mm
Width	69.9 mm	69.9 mm	70.1 mm
Weight	130.0 g	107.0 g	92.0 g
Interface type	SATA	SATA	SATA
Transfer rate			
Synchronous (maximum)	300 MB/sec	300 MB/sec	300 MB/sec
Security	ATA security	ATA security	ATA security
Seek times (typical read, including setting)			
Single track	2.0 ms	2.0 ms	3 ms
Average (read/write)	12 ms	12 ms	13 ms
Maximum	22 ms	22 ms	24 ms
Logical blocks	3,907,029,168	1,953,525,168	1,048,576,000
Disk rotational speed	5400 rpm	5400 rpm	5400 rpm
Operating temperature	**0℃ to 60℃** (32°F to 140°F)		

*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.

NOTE: Certain restrictions and exclusions apply. Contact technical support for details.

11 Statement of memory volatility

The purpose of this chapter is to provide general information regarding nonvolatile memory in HP Business computers. This chapter also provides general instructions for restoring nonvolatile memory that can contain personal data after the system has been powered off and the hard drive has been removed.

HP Business computer products that use Intel®-based or AMD®-based system boards contain volatile DDR memory. The amount of nonvolatile memory present in the system depends upon the system configuration. Intel-based and AMD-based system boards contain nonvolatile memory subcomponents as originally shipped from HP, assuming that no subsequent modifications have been made to the system and assuming that no applications, features, or functionality have been added to or installed on the system.

Following system shutdown and removal of all power sources from an HP Business computer system, personal data can remain on volatile system memory (DIMMs) for a finite period of time and will also remain in nonvolatile memory. Use the following steps to remove personal data from the computer, including the nonvolatile memory found in Intel-based and AMD-based system boards.

NOTE: If your tablet has a keyboard base, connect to the keyboard base before beginning steps in this chapter.

Current BIOS steps

1. Follow steps (a) through (l) to restore the nonvolatile memory that can contain personal data. Restoring or reprogramming nonvolatile memory that does not store personal data is neither necessary nor recommended.

   a. Turn on or restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

      NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

   b. Select **Main**, select **Apply Factory Defaults and Exit**, and then select **Yes** to load defaults.

      The computer reboots.

   c. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

      NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

   d. Select the **Security** menu, select **Restore Security Settings to Factory Defaults**, and then select **Yes** to restore security level defaults.

      The computer reboots.

   e. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

      NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

   f. If an asset or ownership tag is set, select the **Security** menu and scroll down to the **Utilities** menu. Select **System IDs**, and then select **Asset Tracking Number**. Clear the tag, and then make the selection to return to the prior menu.

g. If a DriveLock password is set, select the **Security** menu, and scroll down to **Hard Drive Utilities** under the **Utilities** menu. Select **Hard Drive Utilities**, select **DriveLock**, then clear the check box for **DriveLock password on restart**. Select **OK** to proceed.

h. Select the **Main** menu, and then select **Reset BIOS Security to factory default**. Click **Yes** at the warning message.

The computer reboots.

i. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

> **NOTE:** If the system has a BIOS administrator password, enter the password at the prompt.

j. Select the **Main** menu, select **Apply Factory Defaults and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.

k. Reboot the system. If the system has a Trusted Platform Module (TPM), fingerprint reader, or both, one or two prompts will appear—one to clear the TPM and the other to Reset Fingerprint Sensor. Press or tap f1 to accept or f2 to reject.

l. Remove all power and system batteries for at least 24 hours.

2. Complete one of the following:

● Remove and retain the storage drive.

– or –

● Clear the drive contents by using a third-party utility designed to erase data from an SSD.

– or –

● Clear the contents of the drive by using the following BIOS Setup Secure Erase command option steps:

> **IMPORTANT:** If you clear data using Secure Erase, it cannot be recovered.

a. Turn on or restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

b. Select the **Security** menu and scroll down to the **Utilities** menu.

c. Select **Hard Drive Utilities**.

d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

– or –

● Clear the contents of the drive using the following Disk Sanitizer commands steps:

> **IMPORTANT:** If you clear data using Disk Sanitizer, it cannot be recovered.

> **NOTE:** The amount of time it takes for Disk Sanitizer to run can take several hours. Plug the computer into an AC outlet before starting.

a. Turn on or restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

b. Select the **Security** menu and scroll down to the **Utilities** menu.

c. Select **Hard Drive Utilities**.

d. Under **Utilities**, select **Disk Sanitizer**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

Nonvolatile memory usage

Table 11-1 Troubleshooting steps for nonvolatile memory usage

Nonvolatile memory type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data entered into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	8 MB	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical computer configuration data for select platforms that support HP Sure Start. For more information, see Using HP Sure Start (select models only) on page 82.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using Computer Setup (BIOS), or by changing the Microsoft® Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KB (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed using a utility from the NIC vendor that can be run from DOS.	A utility must be used to write data to this memory and is available from the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC non-functional.
DIMM Serial Presence Detect (SPD) configuration data	256 bytes per memory module, 128 bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	DIMM SPD is programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a computer. The specific write-protection method varies by memory vendor.

Nonvolatile memory type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data entered into this memory?	How is this memory write-protected?
System BIOS	9 MB	Yes	Yes	Stores system BIOS code and computer configuration data.	System BIOS code is programmed at the factory. Code is updated when the system BIOS is updated. Configuration data and settings are entered using the Computer Setup (BIOS) or a custom utility.	**NOTE:** Writing data to this ROM in an inappropriate manner can render the computer non-functional. A utility must be used for writing data to this memory and is available on the HP website; go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.
Intel Management Engine Firmware (present only in select Elite or Z models. For more information, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.)	1.5 MB or 7 MB	Yes	Yes	Stores Management Engine Code, Settings, Provisioning Data and iAMT third-party data store.	Management Engine Code is programmed at the factory. Code is updated via Intel secure firmware update utility. Unique Provisioning Data can be entered at the factory or by an administrator using the Management Engine (MEBx) setup utility. The third-party data store contents can be populated by a remote management console or local applications that have been registered by an administrator to have access to the space.	The Intel chipset is configured to enforce hardware protection to block all direct read/write access to this area. An Intel utility must be used for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash (select products only)	2 Mb	No	Yes	Stores Bluetooth configuration and firmware.	Bluetooth flash is programmed at the factory. Tools for writing data to this memory are not publicly available but can be obtained from the silicon vendor.	A utility must be used for writing data to this memory and is made available through newer versions of the driver whenever the flash requires an upgrade.
802.11 WLAN EEPROM	4 Kb to 8 Kb	No	Yes	Stores configuration and calibration data.	802.11 WLAN EEPROM is programmed at the factory. Tools for writing data to this memory are not made public.	A utility must be used for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Webcam (select products only)	64 Kb	No	Yes	Stores webcam configuration and firmware.	Webcam memory is programmed using a utility from the device manufacturer that can be run from Windows.	A utility must be used for writing data to this memory and is typically not made available to the public unless a firmware

Nonvolatile memory type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data entered into this memory?	How is this memory write-protected?
						upgrade is necessary to address a unique issue.
Fingerprint reader (select products only)	512 KB flash	Yes	Yes	Stores fingerprint templates.	Fingerprint reader memory is programmed by user enrollment in HP ProtectTools Security Manager.	Only a digitally signed application can make the call to write to the flash.

Questions and answers

1. **How can the BIOS settings be restored (returned to factory settings)?**

    IMPORTANT: Restore defaults does not securely erase any data on your hard drive. See question and answer 6 for steps to securely erase data.

    Restore defaults does not reset the Custom Secure Boot keys. See question and answer 7 for information about resetting the keys.

    a. Turn on or restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

    b. Select **Main**, and then select **Apply Factory Defaults and Exit**.

    c. Follow the on-screen instructions.

    d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

2. **What is a UEFI BIOS, and how is it different from a legacy BIOS?**

    The Unified Extensible Firmware Interface (UEFI) BIOS is an industry-standard software interface between the platform firmware and an operating system (OS). It is a replacement for the older BIOS architecture, but supports much of the legacy BIOS functionality.

    Like the legacy BIOS, the UEFI BIOS provides an interface to display the system information and configuration settings and to change the configuration of your computer before an OS is loaded. BIOS provides a secure run-time environment that supports a Graphic User Interface (GUI). In this environment, you can use either a pointing device (touch screen, touchpad, pointing stick, or USB mouse) or the keyboard to navigate and make menu and configuration selections. The UEFI BIOS also contains basic system diagnostics.

    The UEFI BIOS provides functionality beyond that of the legacy BIOS. In addition, the UEFI BIOS works to initialize the computer's hardware before loading and executing the OS; the run-time environment allows the loading and execution of software programs from storage devices to provide more functionality, such as advanced hardware diagnostics (with the ability to display more detailed system information) and advanced firmware management and recovery software.

    HP has provided options in Computer Setup (BIOS) to allow you to run in legacy BIOS, if required by the operating system. Examples of this requirement would be if you upgrade or downgrade the OS.

3. **Where does the UEFI BIOS reside?**

    The UEFI BIOS resides on a flash memory chip. A utility must be used to write to the chip.

4.   **What kind of configuration data is stored on the DIMM Serial Presence Detect (SPD) memory module? How would this data be written?**

The DIMM SPD memory contains information about the memory module, such as size, serial number, data width, speed or timing, voltage, and thermal information. This information is written by the module manufacturer and stored on an EEPROM. This EEPROM cannot be written to when the memory module is installed in a computer. Third-party tools do exist that can write to the EEPROM when the memory module is not installed in a computer. Various third-party tools are available to read SPD memory.

5.   **What is meant by "Restore the nonvolatile memory found in Intel-based system boards"?**

This message relates to clearing the Real Time Clock (RTC) CMOS memory that contains computer configuration data.

6.   **How can the BIOS security be reset to factory defaults and data erased?**

IMPORTANT: Resetting results in the loss of information.

These steps do not reset Custom Secure Boot Keys. See question and answer 7 for information about resetting the keys.

a.   Turn on or restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

b.   Select **Main**, and then select **Reset Security to Factory Defaults**.

c.   Follow the on-screen instructions.

d.   Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

7.   **How can the Custom Secure Boot Keys be reset?**

Secure Boot is a feature to ensure that only authenticated code can start on a platform. If you enabled Secure Boot and created Custom Secure Boot Keys, disabling Secure Boot does not clear the keys. You must also select to clear the Custom Secure Boot Keys. Use the same Secure Boot access procedure you used to create the Custom Secure Boot Keys, but make the selection to clear or delete all Secure Boot Keys.

a.   Turn on or restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

b.   Select the **Security** menu, select **Secure Boot Configuration**, and then follow the on-screen instructions.

c.   At the **Secure Boot Configuration** window, select **Secure Boot**, select **Clear Secure Boot Keys**, and then follow the on-screen instructions to continue.

Using HP Sure Start (select models only)

Select computer models are configured with HP Sure Start, a technology that continuously monitors your computer's BIOS for attacks or corruption. If the BIOS becomes corrupted or is attacked, HP Sure Start restores the BIOS to its previously safe state, without user intervention. Those select computer models ship with HP Sure Start configured and enabled. HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. The default configuration can be customized by advanced users.

To access the latest documentation on HP Sure Start, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.

12 Power cord set requirements

The wide-range input feature of the computer permits it to operate from any line voltage from 100 V ac to 120 V ac, or from 220 V ac to 240 V ac.

The three-conductor power cord set included with the computer meets the requirements for use in the country or region where the equipment is purchased.

Power cord sets for use in other countries or regions must meet the requirements of the country and region where the computer is used.

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.0 m** (3.3 ft) and no more than **2.0 m** (6.5 ft).

- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.

- The power cord sets must have a minimum current capacity of 10 A and a nominal voltage rating of 125 V ac or 250 V ac, as required by the power system of each country or region.

- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

Table 12-1 Power cord requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Argentina	IRAM	1
Australia	SAA	1
Austria	OVE	1
Belgium	CEBEC	1
Brazil	ABNT	1
Canada	CSA	2
Chile	IMQ	1
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
India	BIS	1
Israel	SII	1
Italy	IMQ	1
Japan	JIS	3
The Netherlands	KEMA	1
New Zealand	SANZ	1
Norway	NEMKO	1
The People's Republic of China	CCC	4
Saudi Arabia	SASO	7
Singapore	PSB	1
South Africa	SABS	1
South Korea	KTL	5
Sweden	SEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	6
Thailand	TISI	1
The United Kingdom	ASTA	1
The United States	UL	2

1. The flexible cord must be Type HO5VV-F, 3-conductor, 0.75 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

Country/region	Accredited agency	Applicable note number

2. The flexible cord must be Type SVT/SJT or equivalent, No. 18 AWG, 3 conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.

3. The appliance coupler, flexible cord, and wall plug must bear a T mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, 3-conductor, 0.75 mm² or 1.25 mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.

4. The flexible cord must be Type RVV, 3-conductor, 0.75 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.

5. The flexible cord must be Type H05VV-F 3-conductor, 0.75 mm² conductor size. KTL logo and individual approval number must be on each element. Approval number and logo must be printed on a flag label.

6. The flexible cord must be Type HVCTF 3-conductor, 1.25 mm² conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.

7. For 127 V ac, the flexible cord must be Type SVT or SJT 3-conductor, 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type H05VV-F 3-conductor, 0.75 mm² or 1.00 mm² conductor size, with plug BS 1363/A with BSI or ASTA marks.

13 Recycling

When a non-rechargeable or rechargeable battery has reached the end of its useful life, do not dispose of the battery in general household waste. Follow the local laws and regulations in your area for battery disposal.

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, see the HP website at http://www.hp.com/recycle.

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